VOL. 87 NO. 4

# textile bulletin

APRIL • 1961



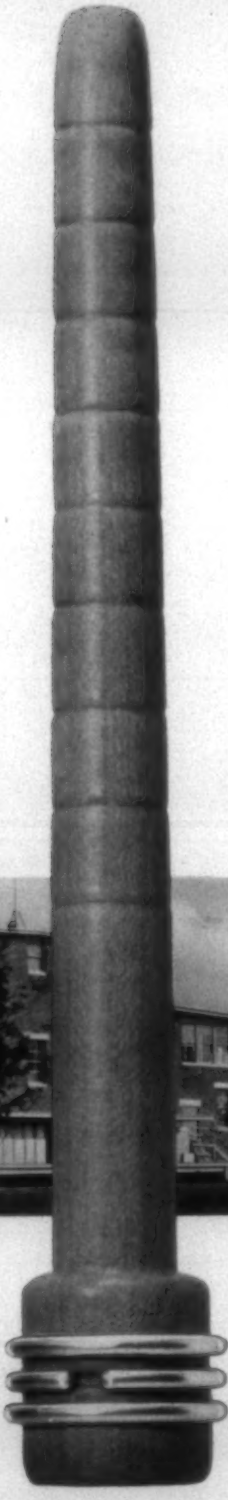
A Progress Report On
**Automatic Doffers**
(Page 60)



*With Emphasis On Quality Control*

**This issue features eight reports on activities in the increasingly important function of quality control in the mill. Titles are listed in our Table of Contents on Page 92.**

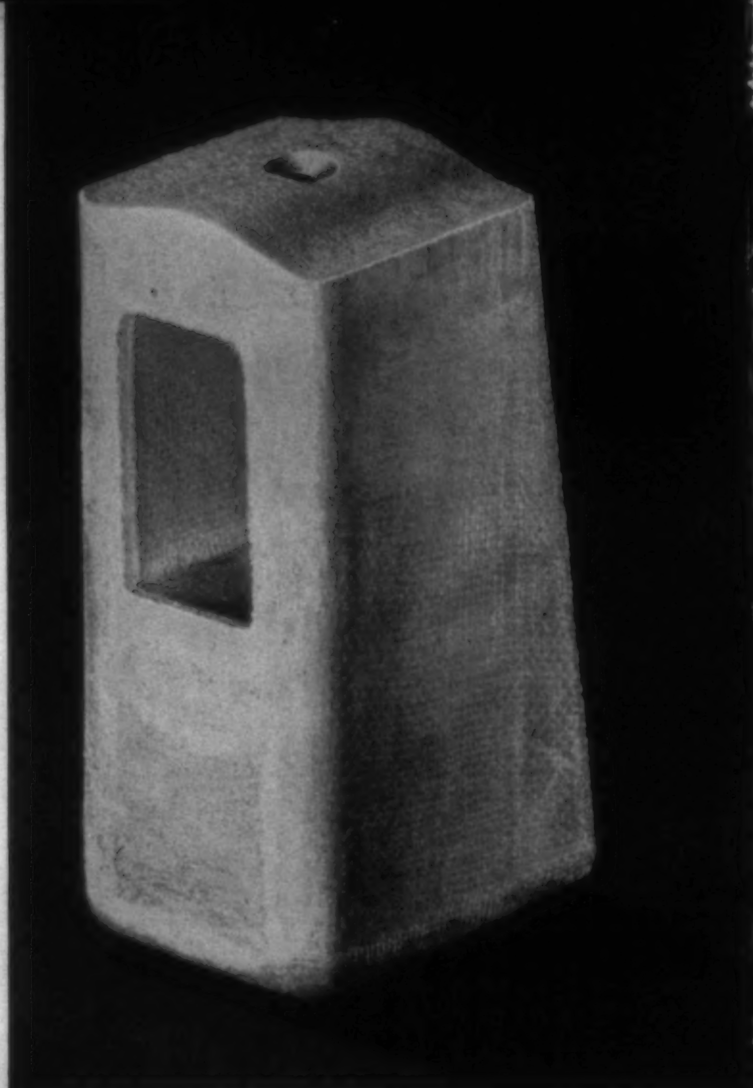
TEXTILE BULLETIN is published monthly by Clark Publishing Co., 218 West Morehead St., Charlotte 6, N.C. Subscription $1.50 per year in advance, $2 for two years. Entered as second-class mail matter March 2, 1911, at Postoffice, Charlotte, N. C., under Act of Congress, March 2, 1897.



BEEBE RIVER, N.H., BOBBIN PLANT

*You name it,*
*Dayco makes it...*

**a Thorobred Picker to handle <u>any</u> assignment!**



1. Dayco Thorobred Premium Loop Picker, readily identified by its gold back . . . rugged and always reliable.

Newest of Dayco's Thorobred Drop Box Pickers is the Golden Thorobred, fully molded in one piece from an ultra-high molecular polyester. Careful in-use studies show that its life expectancy is 10 times that of the conventional picker. If you've used the Golden Thorobred Drop Box Picker and liked it, you may wish to try the Golden Thorobred Loop Picker, now available in many sizes.

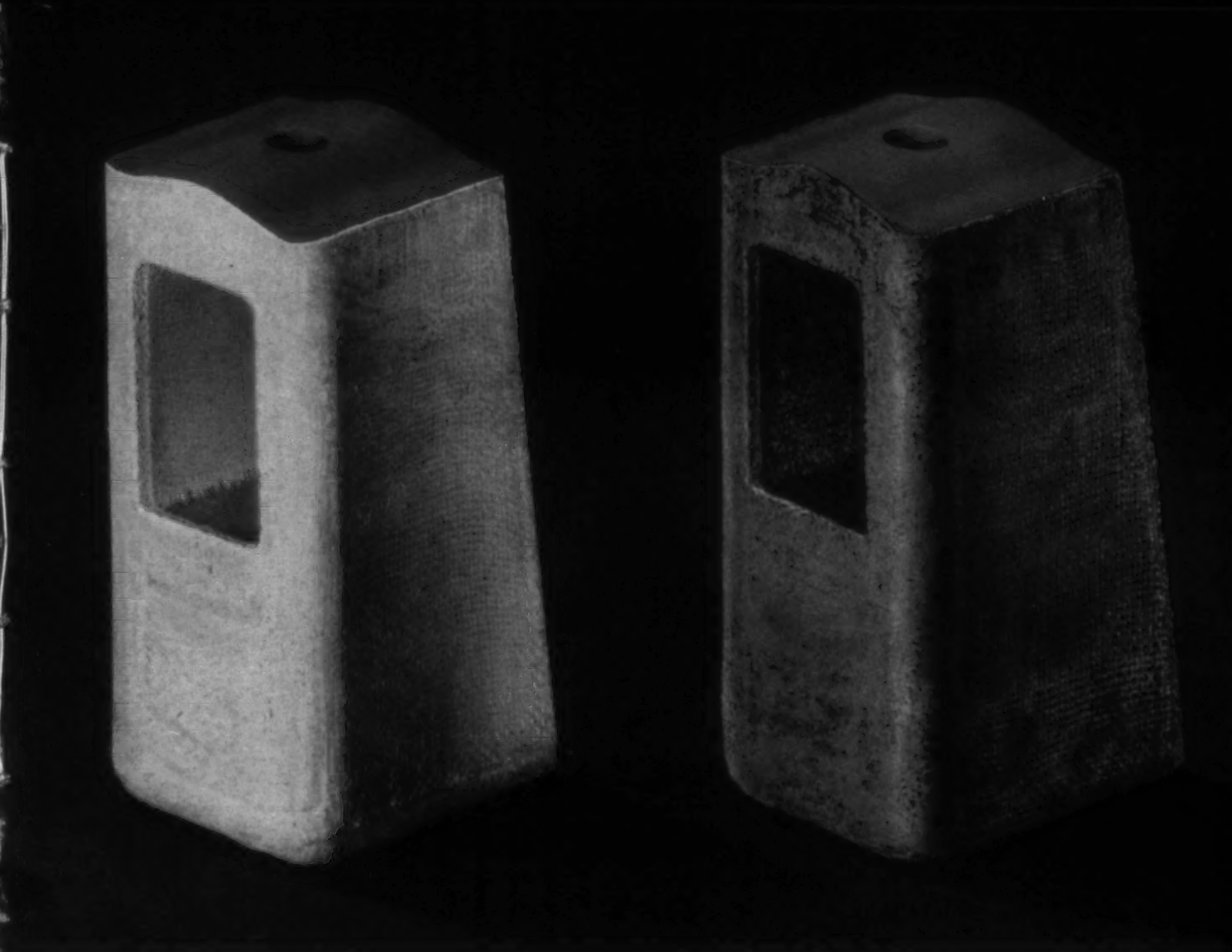
Meet the full family of Dayco Thorobred Loop Pickers! With their help, you'll substitute high production levels for the down-time so often resulting from picker trouble. You'll see the difference in cloth quality that superior picker performance can make. And you'll see a big difference in *quantity*, too.

First, the Dayco Premium Picker. It's really rugged—so sturdy and resilient it amazes even experienced mill men. Once they've become accustomed to its superior performance—even in operations that require the very best—they're sold on Dayco Premium! And little wonder. Keeping perfectly in time through millions of picks, the Premium stays on the job far past normal time for replacement.

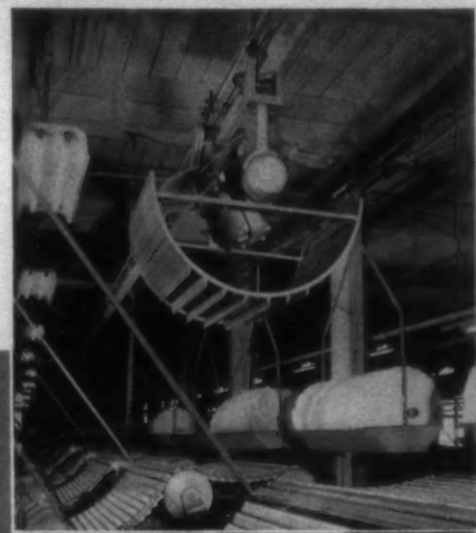
### Bring On Your Toughest Assignment

Perhaps the best way to explain what the Dayco Premium Picker can do is simply to say: bring on your toughest assignment. See the way that this quality loop picker will tackle it. You'll like what you see.

A second outstanding loop picker from Dayco is the Dayco Thorobred Super. Very likely you're already familiar with the Super, for its record of fine



# To the mill man who wants maximum overhead cleaning




You get maximum overhead cleaning with the Aero-Sweep Cleaner because:

- it cleans the objective more thoroughly with head-on air blasts at ½ the distance of other cleaners.
- it cleans all objects throughout cleaning cycle at predetermined frequency.
- only Aero-Sweep has an exclusive patented indexing feature which sets the cleaning pattern for any area, prevents lint accumulation on all surfaces.

You clean your mill at less cost with Aero-Sweep because:

- one Aero-Sweep Cleaner cleans up to three times the area covered by other cleaners.
- it ends manual blow-down by removing lint from ceilings, walls, overhead equipment.
- it minimizes slubs and gouts, improves quality of product.

For details, see **free illustrated** Bulletin 21A. Clip coupon to letterhead and mail today.

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AIR-O-MATION

THE BAHNSON COMPANY • WINSTON-SALEM, N. C.

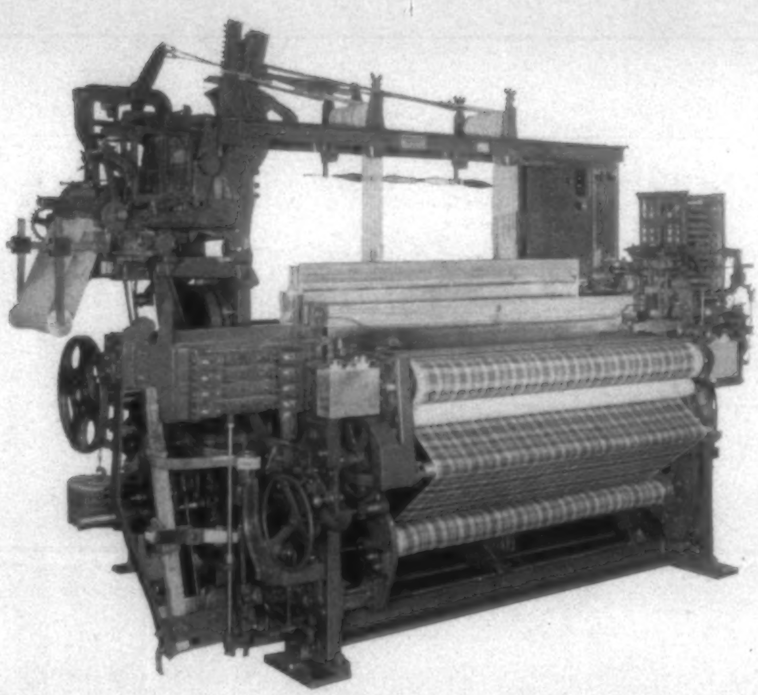
*Crompton & Knowles*
*Provides the Keys to Weaving Profits*
*in These Basic Control Areas*

QUALITY OF CLOTH SPEED OF LOOM EFFICIENCY

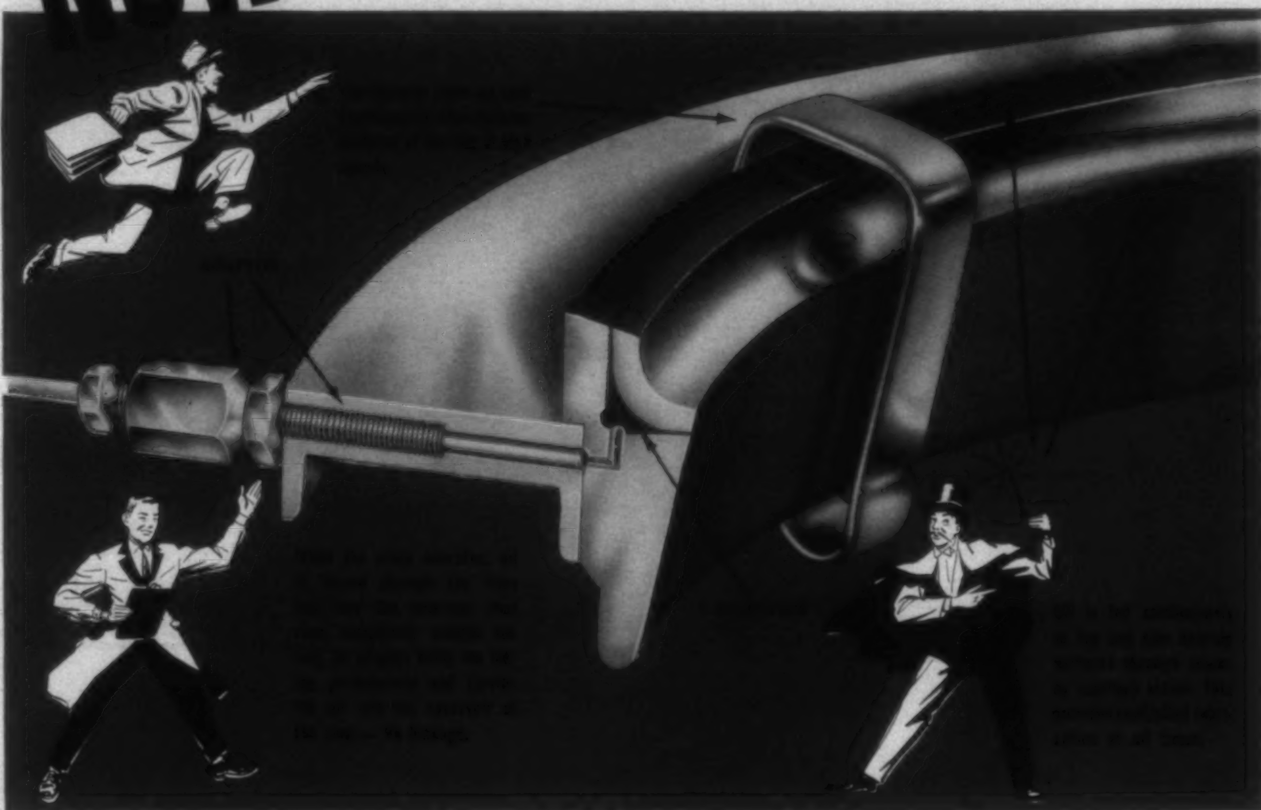
Six factors affect the cost of every yard you weave, and consequently, profits. Competition makes it increasingly important first to recognize then to consider total operating costs. The mill that controls them all with the most modern equipment possible will prosper more than marginally in the sixties.

For a better understanding of some considerations that are frequently overlooked, Crompton & Knowles will explore each cost element. This series will develop a comprehensive evaluation of loom replacement emphasizing cost-cutting intangibles not found in standard replacement formulas.

C & K has pioneered today's most highly controlled weaving with the versatile C-7 line of looms. They have the widest selecton of fabric fields to date of any loom series—terry towels, cotton dress goods, ginghams and fancy filament synthetics. The C-7 provides new benefits in each of the six basic areas to give you the competitive advantage.



# NOW Controlled, Automatic Pressure Lubrication Ideal When Used on "M" Type HERR Conical Rings!



## Each stroke of the oil pump piston is timed to provide the minimum amount of oil to lubricate the path of the traveler. No excess or waste!

**RESULTS:**

1. Cooler operation of Ring and Traveler.
2. Provides longer traveler life.
3. Uniform tension of the yarn at all times due to adequate lubrication of the traveler.
4. Positive assurance of correct oil supply.
5. Faster operation possible.
6. Less ends-down.
7. Oil waste eliminated.
8. No oilcans, no dripping, no overfilling. No labor or supervision required.
9. Keeps costs down.

Always a step ahead, Herr "M" Type Rings are now designed for pressure lubrication from a centralized lubrication system. Oil cups have been eliminated. The oil is introduced through newly designed adapters directly to the annular supply reservoir. (This reservoir runs completely around the ring.) From this reservoir the oil moves continuously by capillary action through the top and side seams. This controlled lubrication assures just the right amount of oil to the traveler. Controlled lubrication because of the special design of Herr "M" Type Rings is entirely self contained. There is no excessive oil, no waste—no overflow of oil to coat other parts of the machine. It is clean lubrication insuring clean yarn without increased maintenance.

*Write for complete information.*

# HERR

**MANUFACTURING CO., INC.**
**312 FRANKLIN STREET • BUFFALO 2, N. Y.**

FOR SPINNING AND TWISTING WORSTED, WOOLEN, RAYON, NYLON, ORLON, FIBERGLASS AND BLENDED YARNS OF ALL TYPES

# For The Textile Industry's Use

## – NEW MACHINERY, EQUIPMENT AND SUPPLIES –

### Jet Dyeing Machine

The Jet Dyeing Machine, a result of a three-year research and development project of the Gaston County Dyeing Machine Co., Gastonia, N. C., and Burlington Industries Inc., Greensboro, N. C., has been introduced as a new concept in fabric dyeing.

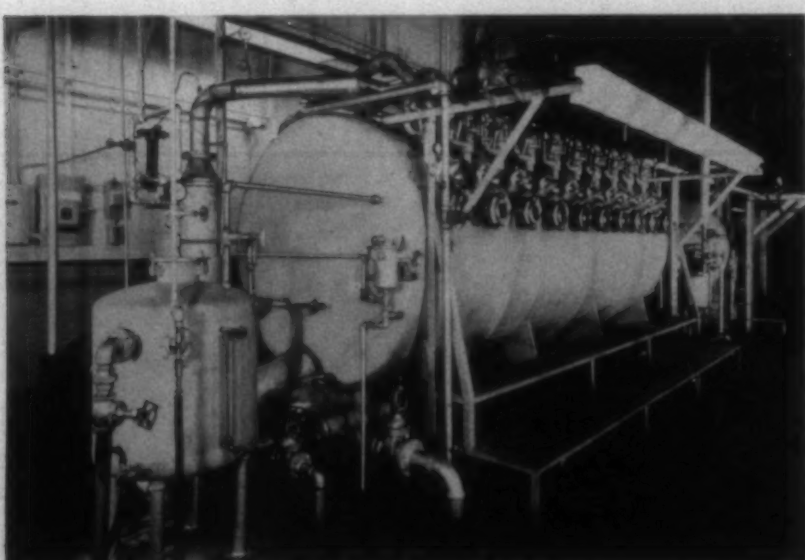
The Jet may be operated above or below the boiling point as required and has a low dye liquor ratio of 10:1 as compared with 20:1 for conventional dye becks. A uniform temperature can be maintained in all parts of the dye bath at all times by means of controlled heating and cooling.

In addition to the above, Gaston County Dyeing reports that the dye bath volume will remain constant due to indirect heating and cooling by an incorporated exchanger; there are no reels or drives to chafe and tangle strands of fabric; the fabric is moved entirely by jet action and dye liquor flow; friction is eliminated because the fabric is encased in liquid; and level dyeing is accomplished without shading from side to side or end to end.

Other advantages claimed for the machine are: complete dye bath exhaustion, improved color fastness and brighter shades, dark shades more easily obtained and soaping and washing much faster and more thorough.

The Jet is said to require fewer chemical carriers in processing certain man-made fibers, give uniform fabric shrinkage from end to end and give a better hand to the finished fabric by means of rapid and constant agitation during processing.

(Request Item No. D-1)



**The Jet Dyeing Machine is the result of a joint research and development project by Gaston County Dyeing Machine Co. and Burlington Industries.**

### Black Dyestuffs

General Dyestuff Co., division of General Aniline & Film Corp., New York City, has introduced three new black dyestuffs — Rapidogen Black GG Solution, Black JF Solution and Black GRW Solution. The three products are stabilized azoic compositions offering individual shades for printing high quality blacks on cottons or rayons, General reports.

Application is by direct roller and screen printing methods, with development by acid aging only. Including a greenish, a bluish and a jet black in self shades, the dyes are suitable for combining with other Rapidogen dyes and serve best in printing deep blacks economically.

Fastness tests show that fastness to light, washing and hot pressing is very satisfactory for cotton or rayon dress goods, the company reports. The lightfastness ratings given are for full shades only as the dyes are not intended for use in lighter shade depths. Because of their fastness to formaldehyde, these dyestuffs are said to be suitable for printing in patterns with pigment-containing resins that release formaldehyde in curing.

The three Rapidogen blacks are all supplied in solution form, and are readily incorporated into printing formulations as regularly made up with neutral starch-tragacanth thickening.

(Request Item No. D-2)

### Web Control

The Webalarm, a go/no-go gage that signals audibly or visually when the width of a moving web falls outside preset tolerances, has been introduced by Matrix Controls Co., Somerville, N. J. The Webalarm is said to be simple and easily installed on existing equipment such as inspection perches, calenders, tenters, dryers or extruders. Matrix reports that it is not affected by sideslip or speed variation of the moving material. Snagproof wands are used to sense each edge of the web with feathertouch contact and the operator is alerted or the process stopped when the width fails to meet specification.

(Request Item No. D-3)

### Plastic Picker

A new method of toughening its Duroleen plastic pickers has been developed by Albert Haag K. G., Weil der Stadt, Germany. The company reports that those parts most subject to punishment have been toughened 30 to 50% by a process akin to tempering. Reports from mills are said to be extremely favorable. Improved performance appears most marked on high-speed looms and looms converted with bobbin-changing mechanisms to automatic weaving, in which pickers are subjected to far more strain than in other looms.

Comparative tests are said to show the new picker to be superior to those ma-

chined from solid blocks of the same basic material. The plastic pickers are said to give several times the life of rawhide pickers and to provide increased loom output through fewer stoppages.

Since no seasoning is required the mill can operate with smaller stocks, buying Duroleen pickers as needed and putting them into use immediately.

Other loom accessories made from the same plastic material are also reported to be proving successful. Duroleen sweep-sticks, buffers, shuttle bowls, lug straps, etc., are said to be giving excellent results.

(Request Item No. D-4)

## Neutral Nylon Red

A new offering of a neutral dyeing red for nylon has been made by Althouse Chemical Co., Reading, Pa.

Called Nylanthrene Red 4RL, the product is replacing the previous offering of Nylanthrene Red 2RWF. It is described as appreciably brighter in shade and has superior fastness to light. The tinctorial strength of the new color has been standardized to the Nylanthrene Red 2AWF, so that it may be substituted in any formulas, with little or no adjustment, according to the company.

The new color is designed to serve as an excellent base for the dyeing of brighter shades of reds or as a shading color for compound shades.

(Request Item No. D-5)

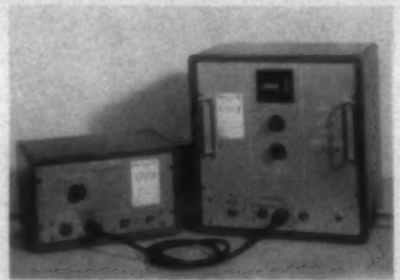
## Auto-Calibrator

Lindly & Co. Inc. of Mineola, N. Y., has announced the development of a portable electronic device—the Lindly Auto-Calibrator Model 1080 — that is designed to both calibrate and automatically check the sensitivity of Lindly Yarn Inspectors.

The compact auxiliary unit is available to the textile industry through Foster Machine Co., exclusive selling agent for Lindly.

According to Lindly, the Auto-Calibrator can be utilized in either or both of two ways. It can serve in place of the mechanically actuated calibrator formerly manufactured by Lindly to set a sensitivity of the inspector whenever the warper stops.

When used for spot calibration, the



**The Lindly Auto-Calibrator connected to Series 1000 Lindly Ultra Yarn Inspector Control Unit.**

Auto-Calibrator is ordinarily moved from one yarn inspector to another for periodic checks. When the continuous monitoring of yarn sensitivity is desired, the Auto-Calibrator is permanently connected to the yarn inspector. A flashing light on the panel of the control unit indicates whether or not sensitivity has been decreased.

The device is entirely electronic in operation, is fully transistorized and is housed in a small cabinet measuring 7x11½x7 inches. Equipped with its own power supply, it can be connected to power sources of either 115 or 230 volts a.c. Lindly claims that its use in conjunction with the new Series 1000 fully transistorized yarn inspectors, or with the older Series 600 equipment, will provide maximum assurance of trouble-free yarn inspection with a minimum degree of operator skill.

(Request Item No. D-6)

## Finishing Compounds

The Arkansas Co., Newark, N. J., has announced the development of two new finishing compounds for use in the production of durable water and oil repellent finishes. Designated HY-AD and HY-AD S, the compounds are said to have already gained acceptance as stabilizers and extenders for oil repellent fluorochemicals in both water and solvent systems.

The stabilizing effect of HY-AD is said to allow for greater compatibility with other desirable adjuvants in the presence of oil repellent finishes, and to prevent pad roll build-up. HY-AD used with FC208 water system and HY-AD S used with FC-203 solvent system both improve oil and water repellency, in most cases, and also increase durability to laundering and dry cleaning. In most formulas, smaller quantities of fluorochemical may be used, due to an increase of efficiency.

In all cases, HY-AD is said to produce a soft, full hand with good lubric-

ity for sewing on high-speed machines. Its versatility is demonstrated by the fact that it is advantageous even in the finishing of fiberglass fabrics.

It also produces hydrophobic properties on all textile fibers, and its anti-soiling properties are outstanding when compared with other water repellent finishes. HY-AD is also said to help prevent build-up of static charges.

No after-washing or neutralizing is required, unless used in conjunction with thermosetting resins. When used in formulas for producing wash-and-wear finishes, resistance to abrasion is improved, as well as tear strength and angle recovery, Arkansas reports.

Several suitable catalysts have been developed for use with the compounds in the production of durable hydrophobic effects with or without fluorochemicals. HY-AD and HY-AD S, used with their catalysts, produce durable water repellent finishes on cottons which are resistant to laundering at the boil.

Other durable finishes can be produced by using the compounds in conjunction with the Arkansas Co.'s silicone water repellents.

(Request Item No. D-7)

## Fugitive Dyeing

Speedry Chemical Products Inc., New York City, has developed a new chemical formula for the washable tinting of synthetic and natural yarns. The new process was developed after many months of research in collaboration with Chemtel Corp. which will market it exclusively under the brand name of Tint-Out.

The Tint-Out process is said to make possible for the first time the direct application to yarn of tints that are completely soluble in water. Speedry points out that the number of yarn types, deniers, filaments and lusters to be found in even a medium-sized mill has made it costly to keep them separated.

The Tint-Out method is said to have already proven to be 100% effective in Dacron and cotton applications in tests conducted with several major yarn manufacturers through fabric finishing operations. All tints have been tested by heat-setting at high temperatures, by exposure to different sizes and to immersion in various chemical solutions found in mill and dye-house procedures. The tints were completely removable in the normal scouring operations or in hot or cold water, and no adverse effects were noted on the finished fabric. Further experiments and evaluations with other fibers are said to be under way.

(Request Item No. D-8)

## Electronic Drive

A new adjustable speed drive with a speed range from 2:1 to 100:1 is available from Square D Co. The new drive features reduced maintenance and close speed regulation. Maximum and minimum speed limits are said to be easily adjusted within the controller to specific applications.

The new Square D drive operates from a single phase a.c. supply. A pair of grid-controlled thyratrons and diode tubes provide full-wave rectified voltage to the drive motor armature. For precise speed regulation regardless of load, an I.R. drop compensating network is employed. The new drive also provides short circuit protection, under voltage and overload protection, a timed method of accelerating to pre-set speed, regulated speed reference supply, and tube circuits that are fail-safe on filament burnout.

The controller and push-button station are enclosed in heavy-duty, N.E.M.A. 1 sheet steel. Industrial construction is followed throughout, the company reports, with cabled wiring and electronic parts fully encapsulated for rugged service. For ease of maintenance, the panel swings down and rests on a pair of "stop-pins" to provide component accessibility from rear of panel. The complete drive is designated Square D Class 8833 Type BG, and includes the controller, push-button station and drive motor. It is available in ratings from ¾ through 4 h.p.

(Request Item No. D-9)

## New Technique For Cord Strapping

A new method of using Avistrap cord strapping in the baling of greige goods has been developed by the Selta Corp. of Charlotte, according to American Viscose Corp., Philadelphia, Pa., producer of the strapping.

In the Selta method the baled greige goods are compressed and the Avistrap strapping is fed from rolls around the bale by hand. Each piece of strapping is tied by hand and cut with a knife. When the pressure is removed from the

In the new Selta method of using Avistrap cord strapping, the bale is compressed and the cord is placed around it by hand and tied.

The cord is cut with a pocket knife, the pressure removed and the finished bale is ready for shipping.

bale it expands somewhat, making the strapping tight.

This method is said to save time and money in that the precutting of straps and the use of tools and conventional seals are entirely eliminated. Overall savings of between 20 and 35% are said to have been achieved. American Viscose reports that upwards of 50,000 bales have been shipped with complete satisfaction from shippers, carriers and receivers.

(Request Item No. D-10)

### Stiffening Agent

Shawinigan Resins Corp., Springfield, Mass., has announced the development of Resin D-809 which is expected to find considerable use as a stiffening agent in finishing both woven and non-woven fabrics. The resin is a fine particle size acetate — multi-polymer latex which is designed to impart a higher degree of stiffness and rigidity to treated materials than can be obtained with unmodified polyvinyl acetate emulsions.

The new emulsion is said to be unique among polyvinyl acetate emulsions in that it does not form a continuous film when dried at room temperature. It must be subjected to moderate heat treatment in order to coalesce the

resin. Continuous fused films of Resin D-809 are said to feature superior scrub resistance, excellent water spotting resistance, good wet strength after prolonged immersion in water and excellent adhesion to a variety of surfaces.

Compatible with a wide range of modifying ingredients, the emulsion may be blended with softer polyvinyl acetate emulsions to produce films of intermediate hardness.

(Request Item No. D-11)

## Nylon Core Belting

A new tensilized nylon core has been incorporated into the Nycor-M transmission belting produced by L. H. Shingle Co., Camden, N. J. The nylon core is oriented in one solid piece the full width of the belt.

Formerly, nylon cores were cemented in 1" widths and then cemented to a cloth backing, in order to hold the strips together longitudinally according to the width of the belting desired.

The new method is said to eliminate need for a clothbacking. Nycor-M belting is more flexible so that it can run over small pulleys and also crown pulleys. Using the new continuous width nylon core with outer plies of chrome leather, Nycor-M has greater strength per square inch. Greater strength and greater flexibility assure better absorption of starting shocks and longer belt life, the company reports.

(Request Item No. D-12)

## Nonmigrating Vat Dyes

A full line of nonmigrating vat dyes designed to give clearer and brighter shades on cotton and rayon, where top fastness is desired, is now available from Allied Chemical's National Aniline Division, New York City.

National's nonmigrating Carbanthrene dyes are said to overcome the problem usually associated with conventional vat dye particles, which generally migrate upon drying after pigmentation on cotton and rayon cloth. This results in shading and a streaky appearance. The migration is sometimes due to uneven drying when the dye particles are drawn to moisture in the slower drying part of the fabric. After several years' research, National Aniline says it has eliminated these undesirable characteristics by improving its existing vat dyes to minimize migration while the cloth dries.

The Carbanthrene nonmigrating vat dyes are available in a comprehensive range of shades.

(Request Item No. D-13)

## Magnetic Sweeper

Steel or iron parts, chips, filings, nails, tacks and other bits of ferrous scrap are said to be quickly removed from floors with the new Sweeperette — a lightweight hand-propelled rotary magnetic sweeper made by Eriez Mfg. Co. of Erie, Pa.

The new multi-purpose, non-electric Sweeperette is powered by a strong, permanent Erium magnet tube mounted on smooth-running neoprene wheels, the rotary magnetic sweeper has a 5' offset handle which permits the operator to push the unit under objects without stooping. Sweeperette is propelled in carpet sweeper fashion, causing pieces of ferrous scrap to jump to the rolling magnetic tube where they evenly distribute themselves to a depth of ¾".

Unloading is said to be quickly accomplished by removing the magnetic tube and clearing it with an attached neoprene wiper ring. A lightweight, detachable collection pan at the base of the handle speeds unloading.

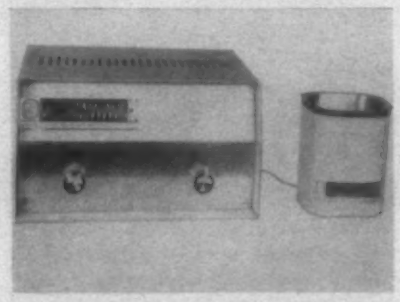
**The Eriez Sweeperette comes in six models with widths from 10-3/16 inches to 34-3/16 inches.**

The magnetic tube is completely removable and may be used as a retriever magnet, small batch cleaner or hand magnet to remove fine or coarse ferrous materials from tanks of liquid or other hard-to-get-at places.

The Sweeperette comes in six models with widths from $10\frac{3}{16}$ to $34\frac{3}{16}$".

(Request Item No. D-14)

## Small Ultrasonic Cleaner To Sell For Under $100



Ultrasonic Industries Inc., Plainfield, N. J., has developed a one-pint capacity ultrasonic cleaner. Designated the diSONtegrator System Thirty, the unit is said to be the first ever offered at a price under $100.

The unit features a broad band frequency modulated circuit which eliminates the need for automatic tuning. The generator is rated at 30 watts average power, 120 watts peak output. Fused for 2 amps, the generator operates from household 117-volt, 50/60 cycle line current.

Operation of the cleaner is said to be as simple as that of a radio. The generator is plugged into any convenient source of 117-volt, 50/60 current, and is designed to consume no more current than a light bulb. Cleaning begins as soon as the tank is filled with a suitable cleaning solution—such as water and detergent or solvent—and the switch is

flipped on. Integral with the tank is a transducer which converts electrical energy from the generator into sound waves of such high frequency that human ears can't hear them.

When this energy is propagated into the cleaning solution, the fluid is exploded 90,000 times per second into millions of submicroscopic vacuum bubbles. The bubble bombardment disintegrates any foreign matter clinging to the object being cleaned. The smallest, hardest-to-reach crevices of any object can be cleaned in a matter of seconds without disassembly.

(Request Item No. D-15)

## Fast Color Bases

Rohner Ltd. of Pratteln, Switzerland, has made available three new fast color bases which have previously been offered only as Diazo fast color salts. These diazotizable bases are: Orange RD; Bordeaux BDC; and Black K.

The Bordeaux BDC and Orange RD Bases have bright, economical and excellent fastness-to-light properties in coupling with various Naphtanilides. The Black K Base is recommended for a Navy and for Bluish Blacks which, also, have good light fastness ratings.

These products are recommended for yarn dyeing and piece dyeing of cottons and rayons and, also, have a potential use for synthetics. The Orange RD Base and Bordeaux BDC Base are suggested for printing on cottons and rayons.

The bases have excellent ratings for chlorine, mercerizing and hot pressing.

(Request Item No. D-16)

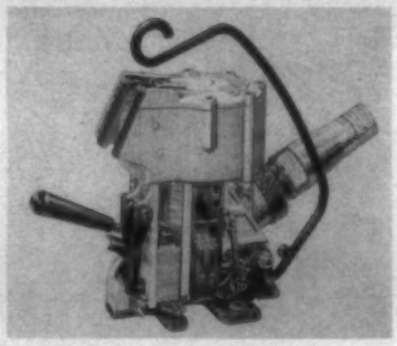
## Pneumatic Strapping Tool

The AMP, a portable all-power-operated combination strapping tool, has been introduced by Signode Steel Strapping Co., Chicago, Ill.

Air power engages the feed wheel, tensions the strapping, applies the seal, severs the strap from the coil and disengages the feed wheel. Previous powered combination models utilized pneumatic or electric power for the tensioning cycle only, Signode reports.

Developed especially for the AMP is a new design of a self-interlocking nested seal that simplifies loading of the tool and permits partial stacks to be loaded. Nibs in the flanges of the seal hold the stack together and in alignment until the seal is automatically fed into position on the strapping.

The AMP's pneumatic power is said to have cut manual operations to a minimum. To complete a strapping cycle, the operator need only open the rear gripper and wipe in the bottom strap end, slide



**In Signode's new portable strapping tool air power is used to engage the feed wheel, tension and strapping, apply the seal, sever the strap from the coil and to disengage the feed wheel.**

the top strap under the feed wheel, press the tension lever, then the sealer lever and swing the tool free from the strapping, according to the company.

The compact design, the short base —4¾″—and the elimination of tensioning and sealing handles are designed to permit the AMP to be used in cramped spaces and on small packages. The tool has a steel base for maximum durability.

The AMP weighs only 22 lbs. and, with its universal suspension bracket, can be used interchangeably in a vertical or horizontal position.

Strap tension is adjustable to 1,200 lbs. at 90 p.s.i. on the AMP58M—for ⅝″ strapping—and on the AMP34M—for ¾″ strapping. Special high-tension models, the AMP58T and AMP34T, deliver 1,600 lbs. for such special applications as brick packaging or strapping ingots. In addition, there is a high-tension model, the AMPR58T, which seals with a reverse notch.

(Request Item No. D-17)

**THE FIRST PRODUCTION MODEL of its new self-contained automatic ball-doffer has been shipped by Warner & Swasey Co., Cleveland, Ohio. The new doffer, installed on an M-3700 Pin Drafter intersecting frame, is being delivered to a well-known New England top maker. Designed to wind, doff and resume winding a new ball in less than 12 seconds time without operator assistance, the new ball-doffer reportedly improves both operator and machine efficiency and reduces downtime. It can handle 18 x 24″ balls weighing up to 50 pounds. Power is by means of a separate ½ h.p. motor, electrically synchronized with the Pin Drafter main drive motor.**

## Synthetic Finish

ECCO Ribbon Finish, a new product of Eastern Color & Chemical Co., Providence, R. I., is a highly condensed thermoplastic resin which gives a stiff, wiry finish to synthetic fabrics. The excellent binding properties cited for the finish are said to make it particularly valuable in preventing edge raveling. The resin of this film forming product deposits a clear, light colored film which does not effect the gloss or luster of fabrics.

ECCO Ribbon Finish contains no oxidizable material. There is, consequently, little danger of discoloration in storage, Eastern reports. It is said to be stable in normal storage conditions in closed containers for 6 to 9 months.

(Request Item No. D-18)


# The world's number one Softener!

**AHCOVEL** —the first and foremost range of softeners — serves more vital functions in textile processing today than ever before. Available in a wide range—cationic, anionic, and non-ionic—there is an Ahcovel to meet the finisher's most exacting requirements for softening, lubricity, resin compatibility, static and soil resistance. For ease of processing and quality of finish—Ahcovel has earned an enviable reputation. AHCOVEL . . . the best known name in the world of softeners!

Quality
PRODUCTS
Integrity

**ARNOLD, HOFFMAN & CO. INCORPORATED**
*55 Canal Street, Providence, Rhode Island • Est. 1815*
*A Subsidiary of Imperial Chemical Industries Limited, England*
*West Coast Representative: Chemical Manufacturing Company, Incorporated of California*

ICI

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# For the Mill Bookshelf

### Switchboard Instruments

Its new low cost Type AB-30 and DB-30 switchboard instruments are described in 12-page Bulletin GEZ-3308 from General Electric, Schenectady, N. Y. The instruments are said to feature accuracy of 1% and to afford savings from 10 to 20%. A large face scale makes for instant readability. The scale and pointer are mounted on the same plane to eliminate parallax error.

The bulletin includes information relating to ranges covered, instrument burden data, dimensions and panel drilling layouts plus external connection and diagrams and other pertinent specifications.

(Request Item No. D-19)

### Bactericidal Agents

A recently issued publication, "Preventol GD and Preventol GDC" (AP-96), on two of the company's fungicidal and bactericidal agents is now available from Antara Chemicals, a division of General Aniline & Film Corp., New York City. The 16-page brochure describes the characteristics of these nonvolatile, chemically stable and non-irritating agents in the processing and preservation of textiles and organic liquids and pastes. Other information given includes typical data on the compounds, including solubility, shipping specifications, preparation and properties of alkaline solutions, summary of uses, microbiocidal activity, toxicity data, method of analysis, and a bibliography.

(Request Item No. D-20)

### Variable Speed Drives

Catalog G-100, a new 88-page publication describing the complete line of Reeves Vari-Speed Motodrives, 1/4 to 40 h.p., has been published by Reliance Electric & Engineering Co., Cleveland, Ohio.

The catalog includes full rating tables, with new additional output speeds. Dimension diagrams and charts for over 100 different assemblies, new higher overhung load and new controls are also contained in the catalog.

The Reeves Vari-Speed Motodrive is a self-contained variable speed drive unit. It includes an a.c. motor, variable pitch pulleys and a gear reduction unit in a single compact housing.

(Request Item No. D-21)

### Temperature Controls

Fenwal Inc., Ashland, Mass., has issued an 8-page brochure describing its new 500 line temperature controllers and indicators. The brochure, MC-195, gives complete details of three models in the line and brief descriptions of other Fenwal instruments offering thermistor sensing.

Contents include complete electrical and mechanical specifications, available modifications, and illustrated descriptions of various major features of the units. Also included are details on how various units can be combined for multipoint control or monitoring with a variety of optional features.

(Request Item No. D-22)

### Calibrator

A compact, portable device for calibrating the company's Lindly Automatic Yarn Inspectors is described in the Lindly Technical Bulletin, Series YI, Number 9, released through the Foster Machine Co., Westfield, Mass.

Called the Lindly Auto-Calibrator, Model 1080, the instrument is entirely electronic in nature. It is fully transistorized and is housed in a small cabinet. Since it has its own power supply, it can be plugged-in to either a 115 or 230-volt source, a.c. The Auto-Calibrator may be used for a quick check on the Inspector or as a continuous checking device by allowing it to remain plugged-in to the Inspector.

(Request Item No. D-23)

### Moisture Tests On Man-Made Fibers

Bulletin AP-17 from The Chemstrand Corp., Decatur, Ala., describes moisture tests that were run on Acrilan 16, Acrilan 1656 and other synthetic fibers. The 6-page bulletin contains a general discussion contrasting the Chemstrand fibers with synthetic fibers from other companies. There are two charts in the bulletin that give the comparisons of moisture absorption between the Acrilan fibers and the others at 70° F. and at 96° F. There are also two tables incorporated in the bulletin. Table 1 gives the per cent moisture regains of man-made staple fibers at 70 and 96° F., and Table 2 shows the per cent moisture regains of natural fibers at 77° F. A section of the bulletin describes the procedures taken to perform these tests. AP-17 lists the fibers and producers for those used in the experiments with Acrilan 16 and Acrilan 1656.

(Request Item No. D-24)

### Fiber Reactive Dyes

A new circular, No. 1425, containing illustrations and rate-of-dyeing curves for the continuous dyeing of cotton and regenerated cellulosics with two fiber reactive dyes, Drimarene Turquoise Z-G and Navy Z-BL p.a.f. has been published by Sandoz Inc., New York City. The circular describes the application of the dyes to the dyebeck, jig and package machines. Fastness tables show that in this type of application, the dyes attain the high wet fastness that is characteristic of the reactive class.

(Request Item No. D-25)

### Man-Made Fiber Manual

The *Manual of Man-Made Fibers* by C. Z. Carroll-Porczynski, a 304-page reference work designed for those connected with textile research and production, has been published by the Chemical Publishing Co.

The book presents the significant qualities of each fiber in concise form. The chemical base, physical and chemical properties, stress-strain curves, dyeing method, identification test, and producer are given for each fiber. Over 120 microphotographs and X-ray diffraction patterns are included for purposes of fiber identification and comparison plus numerous flowsheets, tables, graphs and stress-strain diagrams.

A world list of each man-made fiber producer is included along with an extensive bibliography of all man-made fibers covering manufacture, properties and uses.

The book is available from Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y., at $10 per copy.

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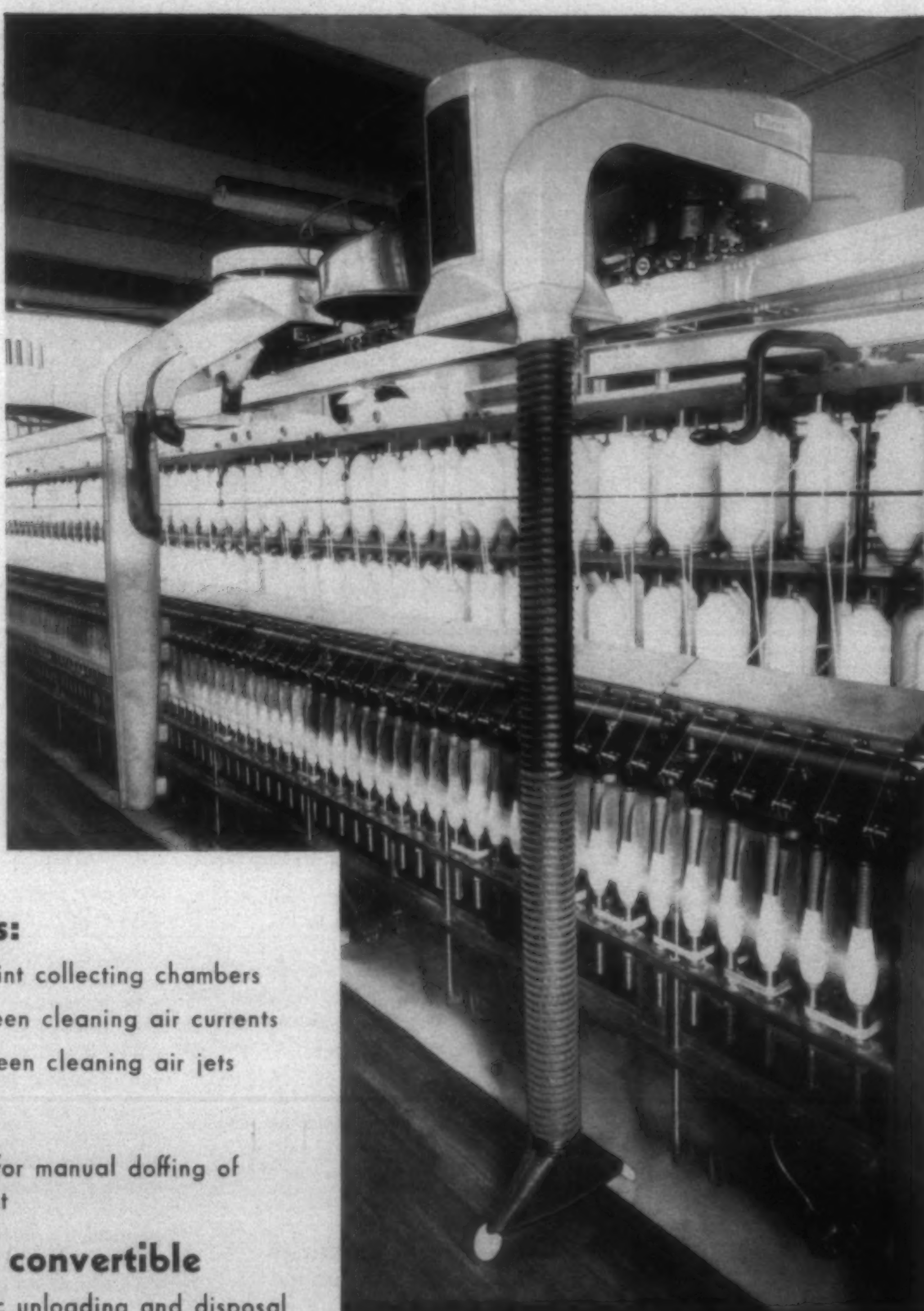

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# Serving The Textile Industry

## American Enka Sales, Earnings Off For 1960

Depressed conditions in the textile industry adversely affected 1960 sales and earnings of American Enka Corp., according to Philip B. Stull, company president.

Sales for the year amounted to $95.4 million, off 12.5% from $109.2 million in 1959. Net income of $678,000 was sharply under the $5.7 million a year ago.

For Enka 1960 was a year of further adjustment to the competitive environment of the synthetics industry. "The rayon area of our business," Stull pointed out, "continues to suffer from an excess of industry capacity, unsatisfactory prices, and the burden of foreign imports, especially for rayon staple fiber."

A series of cuts in the price of Tyrex rayon tire yarn hurt Enka earnings. During 1960, the firm sold Tyrex at about 18% less than in mid-1959.

## Belmont, N. C., Warehouse Planned By Foster Machine

The Foster Machine Co., Westfield, Mass., has announced plans for the operation of a repair parts warehouse in Belmont, N. C., to service the many installations of Foster winders in the Southeastern U. S. This property will include facilities for an office and showroom.

## Industrial Rayon Reports Termination Of Losses

Industrial Rayon Corp., Cleveland, Ohio, reports that operations in the first part of 1961 indicate that losses have been terminated. Frederick L. Bissinger, president, said that the reorganization measures undertaken in the second half of 1960 have resulted in substantially increased efficiencies and that the company's competitive position has been altered favorably.

The company reported a net loss of $3.3 million in 1960 on sales totaling $47.4 million. In 1959, net income was $839,000 and sales were $62.1 million. A special charge of $3.3 million was made in 1960 against retained earnings for obsolescence of idle plant facilities and other losses incident to consolidation of operations after credit from disposal of facilities. Working capital increased $3.3 million during 1960 and amounted to $41.2 million at the end of the year.

The company reports that preliminary optimistic forecasts for tire cord sales in 1960 induced the industry to build up inventories in the early months of the year. When the anticipated demand failed to materialize, profits from tire cord sales were virtually eliminated by lowered industry selling prices and the costs of subsequent curtailed operations. Industry shipments of rayon tire yarns, which constitute Industrial Rayon's principal products, were reported off 16% from 1959 shipments.

## Gossett & Co. To Handle Scotch Spinning Units

Ralph Gossett & Co., Greenville, S. C., has been named exclusive U. S. representative for J. & T. Boyd Ltd. of Glasgow, Scotland, for that firm's spinning and twisting frames. Gossett will handle the Boyd draft ring spinning frame and stop-motion twisters.

## H. J. Theiler Named Agent For Knotex Warp Tying Unit

The H. J. Theiler Corp., Whitinsville, Mass., has been named exclusive U. S. agent for the Knotex warp tying machine which is manufactured in West Germany. The tying unit is compact and ties almost any fiber in 35 to 80% less time than is required by hand.

Machine speeds vary up to 600 knots per minute, depending on the fiber and yarn count. Easily portable, the unit can be used in the loom, behind the loom or in a stationary set-up, according to Theiler.

## 12% Drop In Earnings Reported By Celanese

Celanese Corp. of America reports earnings after taxes for 1960 of $19.9 million, a decline of approximately 12% from the 1959 earnings of $22.6 million. Net sales for 1960 were $264 million as compared with the record 1959 sales of $265.2 million.

An extensive plant capital investment program was carried out during 1960 in the interest of sustained corporate growth, the company reported. Gross addition to plant and equipment during the year totaled $39.8 million, of which $26.8 million was for domestic operating companies and $13 million for affiliated American and foreign companies.

## Ultrasonic Industries Inc. Relocates To Plainview, L. I.

Ultrasonic Industries Inc. has relocated to Engineers Hill, Plainview, L. I., N. Y. The company's new 18,000-square-foot facility on two acres is four times as large as the space formerly occupied in Albertson, Long Island, where Ultrasonic was founded in 1959.

National sales headquarters of the company as well as engineering and manufacturing departments are located in the new building. Robot Metalcraft Corp., a subsidiary specializing in precision sheet metal fabrication, is also integrated in the Engineers Hill operation.

The company reports that the additional space will enable it to meet the increased demands for diSONtegrator ultrasonic cleaning equipment.

## Draper Corp. '60 Earnings Show Substantial Gain

Consolidated net sales for Draper Corp. in 1960 reached an all-time high of $61.7 million, an increase of 20% over 1959. Its net profits after taxes on a consolidated basis amounted to $3.4 million against $2.1 million in 1959.

The increased earnings were largely the consequence of higher volume which enabled the company to maintain production at a satisfactory level throughout the year, it was reported. The backlog of machinery orders is equal to that of a year ago and current production schedules are running into the third quarter of 1961 for the company. Volume dropped off in the other areas of Draper's business, it was reported, but is improving at present.

Thomas H. West, president, said, "There are presently about 1,800 of our DSL (shuttleless) looms in successful operation on certain medium and coarse fabrics in 15 mills. Widening the range

"Mine are cut from Dillard paper!"

of this machine to provide the versatility required in the textile industry continues to be our major effort in research and development. Not until this is achieved, as we are confident it will be, can we look forward to production of this loom in profitable volume.

"As announced in the public press recently, we have agreed to acquire from Willcox & Gibbs Sewing Machine Co. the patent rights to the Treufus automatic doffing machine, which promises substantial labor savings to the textile industry."

Draper during the year formed Marion (S. C.) Industries Inc. to manufacture certain of its loom parts in the South. The 50,000-square-foot plant was completed and the installation of machinery was begun in the early part of 1961. A major rearrangement of its facilities at Hopedale was begun in 1960 and is scheduled to be completed in 1961.

## Texize Chemicals Begins Addition To Its Plant

Construction of a 34,000-square-foot addition to the Texize Chemicals Inc. plant in Greenville, S. C., has begun, according to President W. J. Greer. The addition is being built by Daniel Construction Co. and the wall construction is well under way.

The addition is to be of brick, concrete and steel. It will be one-story in height with a 6,000-square-foot mezzanine.

Installation of equipment will start immediately after the building is completed and the facilities should be in production by mid-May. The addition will provide work for approximately 40 additional employees.

## Leesona Corp. Reports Improved Sales, Earnings

Improvements in both sales and net income were reported by Leesona Corp. for 1960. Net income was $2.6 million as compared with $2.3 million in 1959. Sales and other operating income increased from $24.9 million in 1959 to $31.2 million in 1960. The company reports that this increase was sufficient to overcome the effect on net income of higher costs of manufacture and increased expenditures on research and development.

The company reports that in spite of the fact that the textile industry, its largest market, was affected substantially by the current decline in business activity, it has been able to produce and deliver its machines throughout 1960 at a rate materially higher than 1959.

Leesona's current rate of incoming orders has now contracted, it is reported, and unless this trend can be reversed, the company expects its production for 1961 to be lower than for 1960.

In August the company broke ground for a new $3.5 million plant in Warwick, R. I., to house its textile and coil winding machinery operations. Construction is said to be well along with the plant expected to be in operation early in 1962.

## Akron Spool & Mfg. Offers Spool Identification Service

As a further service to the textile industry, Akron Spool & Mfg. Co., High Point, N. C., is now permanently attaching a 3/8" silver disc to the heads of repaired spools to make them easily distinguishable from spools which have not been repaired.

The company points out that when a mill wishes to send a shipment of spools off for repair or alteration it is difficult to distinguish those spools which have already been repaired. No charge will be made for this special service.

## American Cyanamid Suffers 10% Drop In Net Earnings

A decline of 10% in profits has been reported by American Cyanamid Co. and its subsidiaries for 1960. Net income totalled $46.8 million as compared with $52.3 million in 1959. Sales for 1960 at $578.4 million were off slightly from 1959's $583.6 million. The company reports that its earnings were cut partly by increasing expenditures for the developments of markets for Creslan acrylic fiber. Outlays for additional field personnel to make possible more effective marketing of Cyanamid products and lower sales were also credited with having held earnings down.

## E. E. Smith & Son Sold To Seabrook Interests

E. E. Smith & Son Inc., Gastonia, N .C., producer and distributor of repair part for textile machinery, has been sold to C. G. Seabrook, Cordes Seabrook Jr., and Bill Seabrook of Anderson, S. C. The firm will continue to operate under the Smith name. The Seabrooks are owners and operators of Seabrook Transmission Co. in Anderson. Under the new management, C. G. Seabrook will serve as president; David P. Long vice-president and general manager; Bill Seabrook, secretary; and Cordes Seabrook Jr., treasurer.

## Despite Record '60 Sales Du Pont Earnings Decline

Despite a new record high of $2,143 million in its sales for 1960, net earnings from operations of the Du Pont Co., Wilmington, Del., declined 14% as a result of the current price-cost squeeze on American industry, reports Crawford H. Greenewalt, president.

Sales advanced 1% in dollar volume and 4% in physical volume over 1959, while the company's index of selling prices declined 3%. The average gross operating investment increased from $2,745 million for 1959 to $2,933 million for 1960, chiefly for new and expanded manufacturing and service facilities.

Net earnings per share of common stock were $8.10, of which $5.57 was derived from operating activities and $2.53 from dividends on the company's investment in General Motors Corp. Earnings for 1959 were $8.92 per share, of which $6.38 came from operations and $2.54 from General Motors dividends. Dividends paid on the common stock were $6.75 per share compared with $7 in 1959.

Commenting on the price-cost problem, Greenewalt noted that industrial wages and salaries with associated supplementary benefits have been increasing steadily for more than a decade.

"As a result," he said, "manufacturing costs for Du Pont and for industry generally have advanced at a rate outpacing the compensating effects of increased production and technological advances."

## Nopco Plant To Provide Urethane Foam Ingredient

Nopco Chemical Co. has announced the beginning of construction on its new $7 million isocyanate plant. The plant will be located on a nine-acre site in the Tremley Point section of Linden, N. J.

Scheduled for completion by the end of 1961, and production by early 1962, the new plant will make principally toluene diisocyanate (TDI) a basic ingredient for the urethane foams produced by the company's plastics division.

The plant will make Nopco the only producer of urethane foam with a fully integrated operation supplying its own isocyanates.

H. W. Boynton, project manager for Nopco, has announced that the plant will have a design capacity of ten million pounds per year, expandable to 20 million. Forecasts on the growing application of urethane foam for consumer goods, including fabrics, indicate that Nopco's own consumption of TDI by 1962 will permit the plant to operate at a high level of production.

## 1960 Was A Banner Year For Crompton & Knowles

Crompton & Knowles Corp., Worcester, Mass., reports substantial gains in 1960 over 1959. Net earnings for 1960 were $2.5 million as compared with $1.5 million in 1959. Sales for the year totalled $31.1 million against $22.8 million in the previous year. Textile machinery parts accounted for slightly more than $20 million or 65% of all business.

New machinery and other capital facilities cost $1.2 million, including an addition to the company's jacquard plant in Pawtucket, R. I. Working capital rose during the year to $12.8 million.

Frederick W. Howe Jr., president, in his report to stockholders said that the company enters 1961 with "great confidence even though the outlook presently does not seem to promise the same opportunity for progress which was so clearly marked for us at the beginning of the banner year just ended."

## Tow Transformer Unveiled At Roberts Co. Plant

The Roberts-Termatex Tow Transformer (TB, February, '61), which is designed to transform synthetic tow into sliver in one operation, was unveiled at a special showing recently at the Roberts Co. plant in Sanford, N. C.

The machines are presently being manufactured in Milan, Italy, by the Termatex Co., an affiliate and licensee of the Roberts Co. For the U. S. market, component parts are being produced and fitted at the Roberts plant. The company said that the machines can be acquired on a rental basis and delivery at present requires approximately three to four months from order date.

G. N. Giraudi, vice-president of the firm and who as director of yarn and fabric development headed the program to develop the machine, said at the showing, "The future of synthetic fibers in many fields appears to lie with the processing of tow into sliver for both the cotton and worsted systems. New machinery and techniques provide the mill with a tow to top system that is versatile, flexible, low cost and on which many new fabrics can be achieved."

He further pointed out, "The key to satisfactory application of synthetic fibers, of combinations of fibers and of desired color lies in proper and intimate blending. Full consideration to blending must be given at every step in the transformation of tow to sliver and then into yarn in order to achieve the desired yarn character on a consistent basis."

## Record Sales And Earnings Reported By Sonoco Products

Sonoco Products Co., Hartsville, S. C., showed record highs in consolidated net earnings, sales and dividend payments in 1960, according to C. W. Coker, president.

As shown in the company's annual report, net earnings were $2.5 million, including those of the fully-owned domestic subsidiary, Newton Paper Co. Earnings rose from $2.37 to $2.39 a share on each of the 1,028,984 outstanding shares.

For 1960, the sales figure was $38 million compared to $36 million in 1959.

Sonoco reports that its continuing program of product diversification, the expansion of plants and facilities, and the increase of sales personnel were the main factors responsible for the sales increase in 1960.

## Vycron Being Offered For Fabric Development

Beaunit Mills Inc., New York City, producer of Vycron, a new polyester fiber, has released information on two new yarn types available for fabric development, each engineered for a particular end use. Type 1 is a high-strength yarn particularly adaptable for sheer and open construction and Type 2 is a yarn designed to be easily compatible with cotton.

Type 1 Vycron is used in lightweight voiles and batistes, providing strength and wash-and-wear characteristics. Although this fiber is finespun, its high tensile strength allows it to be used for sheer materials without a corresponding loss in fabric strength. The result is a remarkably tear-resistant, pull-resistant fabric, Beaunit reported. Ponemah Mills is selling these weaves in a 50/50 Vycron and Avron blend.

Type 2 Vycron is appearing in popular broadcloths, as well as special blends with rayon. J. P. Stevens is showing a dressweight broadcloth that is a blend of this new polyester and Topel, a fabric which has a worsted hand attributable to the Vycron fiber's "wooliness."

Beaunit officials said that mills are working with Vycron in blends with rayon and wool to produce worsted effects in wash-and-wear suitings, with the object of expanding polyesters in the men's "all-year-round suit" market. Lightweight uniform worsted in Vycron-rayon blends already are on the market through J. P. Stevens and the H. B. Ogden Co.

Vycron is spun by the Beaunit Fibers Division from Vitel, a resin produced by The Goodyear Tire & Rubber Co.

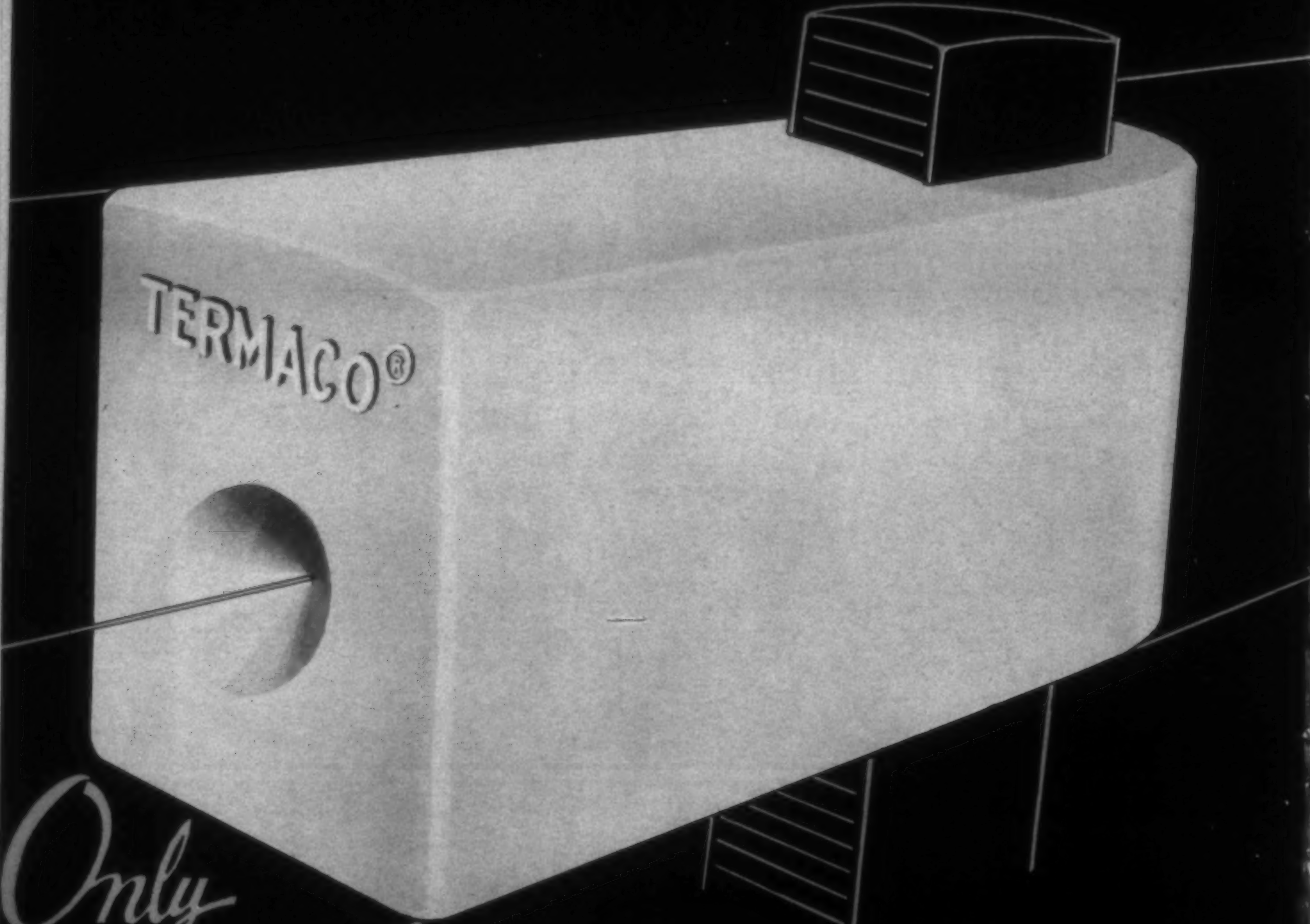
## American Viscose Reports Drop Of 14% In '60 Sales

American Viscose Corp. reports lower sales and earnings for the year 1960. Net sales were $207 million—14% below sales in 1959. Earnings, after taxes, were $6.8 million compared to $15.2 million in the previous year.

In commenting on the results for the year, Dr. Frank H. Reichel, chairman of the board, and Gerald S. Tompkins, president, noted that the general level of business activity, especially in the textile industry, had fallen below expectations early in the year. The corporation's cellophane and acetate business continued to improve in 1960, but rayon yarn and staple shipments were considerably lower than last year.

## Lindly & Co.'s Sales Rise 13% In 1960 From 1959

Lindly & Co., Mineola, N. Y., producer of transistorized industrial electronic equipment, reports a 13.3% increase in sales for 1960 as compared with 1959, despite a poor fourth quarter in 1960. The company reports that it began 1961 with a substantial backlog of orders for proprietary products from both foreign and domestic sources, as well as prime contracts from the U. S. Air Force and Signal Corps for electronic and optical equipment. According to Howard C. Lindemann, president, the new Lindly transistorized Ultra Yarn Inspector is expected to help push sales in 1961 to another all time high.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textile bulletin

VOL. 87 APRIL 1961 NO. 4

# Sampling Textile Materials

## SAMPLING PLUS THE USE OF BASIC FORMULAS HELPS DETERMINE CERTAIN CHARACTERISTICS OF A LARGE AGGREGATE OF MATERIAL

By DR. R. C. HADER*

THE objective of this paper is to clarify certain basic concepts in connection with the sampling of a manufactured product. It takes only a few moments of reflection to appreciate the tremendously important role of sampling in the textile industry.

From the raw material to the finished product important decisions are continually being made by management on the basis of relatively small samples. Even at those points in the process where so-called 100% inspection is still felt to be necessary, a sample check often follows to insure the adequacy of the inspection. It is clearly of some importance that the basic principles of sampling be understood by management at all levels though perhaps the details can be left to specialists.

### General Purposes Of Sampling

Sampling in industry is usually carried on for one of two general purposes. The first and most traditional purpose is to ascertain, within acceptable limits of error, certain characteristics of a given large quantity of raw material or finished or partially processed product. A second and equally important purpose is to detect uncontrolled changes in a process or to gain assurance that such changes have not taken place. We might call this latter form "process control" sampling. It is, of course, the basis for statistical quality control.

To some extent the results from control sampling are also used to characterize shipments or other quantities of material produced during a specified time period. A recent development in U. S. Defense Department inspection is the substitution of certification of the contractor's quality control system in place of lot by lot inspection of the finished product. Of course, some spot checks are still made on a small fraction of the lots.

### Populations

For either general purpose outlined above the sample is taken in order to represent some larger aggregate of material or of possible results. In the language of sampling specialists this has come to be called the *population,* a term carried over from the social sciences. The population need not consist of a group of people. It may equally well be a large shipment of pairs of women's hose, or of cones of yarn or bales of cotton. It may consist of all of the yarn of a certain type produced in a specified time period. In some cases the population is made up of readily identifiable distinct elements, e.g., pairs of hose, some of which may be selected as a sample. In other cases the population is made up of bulk material or of a continuous product such as yarn or fabric. For purposes of packaging or other reasons it may be split up into discrete units but the sampling unit is often only a small fraction of each such package. For some purposes as little as ten inches of yarn serve as the basic test specimen. While at first it may seem highly artificial it is nevertheless useful, in this case, to think of the population as made up of *all possible ten-inch specimens* that could be cut from the large quantity of material the sample is intended to represent. Such a population will never exist physically and indeed it need not exist in order for it to be a useful concept.

The choice of the particular test—including the size and shape of the test specimen—is presumably based on the supposition that the result is closely correlated with other important practical properties of the material. The latter may be considerably less tangible and perhaps impractical to measure directly. However, strictly speaking the sampling results for ten-inch test specimens permit direct inferences only to the hypothetical population of all possible ten-inch specimens.

One further remark along these same lines is that if we change from a ten-inch test specimen to a 20-inch test specimen the population is then one of all possible 20-inch specimens and its characteristics are very likely to be altered. For example the average strength will surely be changed. And yet it is the same large quantity of yarn being sampled.

### Stratified Populations

In the social sciences it is often advisable to consider the population as being composed of sub-populations or strata. Within each such stratum various characteristics of interest to the investigator are less variable from individual to individual than are the same characteristics from one stratum to another. The strata might, for example, be income classes, sections of a city, race, religion or age.

Stratified sampling is employed for several purposes, one of which is to increase the accuracy of the final estimates for the whole population. Another purpose might be to find out how much variation does exist from stratum to stratum. Whatever the purpose, when inferences are made, the method of sampling must be taken into account. The analysis appro-

*Professor of Statistics, North Carolina State College, Raleigh. Dr. Hader's paper was presented before the Spring meeting of the Textile Quality Control Association, March 23-24, 1961.

priate for a stratified sample is quite different from that for a simple random sample of the whole population.

In the sampling of textile materials we often find instances where the sampling is closely analagous with stratified sampling. A simple example is that of selecting a number of cones or bobbins of yarn and then testing several specimens within each cone or bobbin. It is well known that the results on specimens from the same bobbin differ less than the results from different bobbins. The bobbins may be regarded as analagous to the strata. We must be very careful to recognize the existence of bobbin-to-bobbin variation as well as within bobbin variation. In the analysis of such data we must make appropriate allowance for the fact that the sample comes to us not as a completely random sample of N units but rather as n units from each of k bobbins (N = kn).

## Population Characteristics

The preceding sections were concerned with the nature of populations and especially with the nature of their basic elements or units. Each such element has attached to it the values of one or more characteristics, e.g., strength, count, twist, etc. The experimenter may be interested in several of these characteristics simultaneously.

For our present purpose we shall assume only one is involved, say the strength. Considering the population as a whole we want to know such things as the average value of the strength, how much the strength varies in the population and perhaps how much of the variation is "between bobbins" relative to "within bobbins." And, of course, we want the answers to these questions not merely for the sample specimens but for the population that the sample represents.

An especially important characteristic of textile materials is lack of uniformity or unevenness. It is worth mentioning a possible source of confusion in terminology at this point. Unevenness is itself a basic property which may be measured on each of suitable test specimens. It is usually given as a percentage of the average thickness and is in fact very much like a coefficient of variation. As a basic property it varies from one specimen to another just as does strength or twist. This sample-to-sample variability is also measured as a coefficient of variation. While it may be related to the basic property of unevenness it is necessary to keep the two separate for it is the sample-to-sample coefficient of variation which basically controls the reliability of the results and enters into such matters as appropriate sample size. This will be discussed further in the next section.

## Sampling Errors: Completely Random Sampling

Consider the sampling of a large lot of women's hose for the purpose of estimating the average length. Suppose we take N = 10 stockings at random, measure each and calculate the sample average, $\bar{x}$. This sample average would then be taken as an estimate (the best available) of the lot (population) average. We recognize that our estimate $\bar{x}$ is subject to sampling error. How large is this error likely to be? No important decisions can be made on the basis of $\bar{x}$ unless we know within reasonable limits how reliable it is. Sampling theory furnishes the answer to this question.

The random variation in length of women's hose can be expressed quantitatively by an index called the standard deviation, $\sigma$. Approximately 68% of the stocking lengths lie within plus or minus one standard deviation of the mean; 95% lie within two standard deviations and practically all (99.7%) within plus or minus three standard deviations. Strictly speaking these percentages apply to the theoretical normal distribution only but they serve well enough for most practical cases. Thus if a single stocking is taken as a sample and its value used to estimate the population average it can be expected to be in error by no more than $\pm\ 3\sigma$ with a high degree of assurance or by no more than $\pm\ 2\sigma$ with slightly less assurance.

If instead of a single stocking we take the average value, $\bar{x}$, of a sample of N stockings, then sampling theory predicts that $\bar{x}$ will lie within $\pm\ \sigma/\sqrt{N}$ of the population mean about 68% of the time, within $\pm\ 2\sigma/\sqrt{N}$ about 95% of the time and within $\pm\ 3\sigma/\sqrt{N}$ about 99.7% of the time. By proper choice of N these limits of error can be reduced to whatever size is felt necessary. The only rub is that the value of $\sigma$ may not be known before the sample information is available. In this case we may estimate $\sigma$ from the data and proceed to use it in the above $\pm$ limits but with multipliers slightly modified from the $\pm$ 1, $\pm$ 2, $\pm$ 3 according to Student's "t" Table. Confidence limits constructed in this manner can have pre-selected probabilities of error.

For purposes of deciding on appropriate sample size the value of $\sigma$ must be available from prior information. If so we may set up a requirement that N be large enough to yield a 95% (or other specified percentage) probability that the sample $\bar{x}$ lies within $\pm\ \Delta$ (pre-specified) of the true population average. In equation form this is:

$$\frac{1.96\,\sigma}{\sqrt{N}} = \Delta$$

whence $$N = \frac{(1.96)^2\sigma^2}{\Delta^2}.$$

The factor 1.96 is slightly more accurate than the value 2.00 used earlier. For probabilities other than 95% the appropriate factor can be found in normal distribution tables.

Usually the standard deviation is converted to a coefficient of variation, C.V., by expressing it as a percentage of the mean. If the quantity $\Delta$ is likewise expressed as a percentage of the mean, say E, we get the more familiar formula.

$$N = \frac{(1.96)^2(\text{C.V.})^2}{E^2}.$$

To illustrate the use of this formula suppose we anticipate (from earlier work) a coefficient of variation of 2%. We wish to have 95% assurance that the sample $\bar{x}$ will be within $\pm$ 1% of the true average. Then

$$N = \frac{(1.96)^2(2)^2}{(1)^2} \cong 16.$$

## Sampling To Estimate Coefficient Of Variation

Suppose that interest centers on the coefficient of variation. If the C.V. is estimated from a sample, what can be said about its probable limits of error? And what sample size is necessary to estimate the C.V. to within specified limits of error?

The exact answers to these questions are not quite so simple; however, reasonably satisfactory approximations are available. We first consider the case where the standard deviation

is to be estimated from the sample by the root-mean-square method:

$$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

and the coefficient of variation then calculated as

$$C.V. = \frac{s}{\bar{x}} \times 100.$$

It may then be shown that approximately 95% of the time the sample C.V. will lie within

$$\pm 1.96\,\alpha \sqrt{\frac{1 + 2(\frac{\alpha}{100})^2}{2(n-1)}}$$

of the true value where $\alpha$ is used for the true (or population) C.V. The terms $2\,(\frac{\alpha}{100})^2$ will generally contribute very little to the quantity under the square root sign and can be omitted.

To use the formula in practice we would have to substitute for $\alpha$ the C.V. observed in the sample. To solve for an appropriate sample size we could again set up a requirement that this 95% interval be of pre-assigned width $\triangle$. Then

$$1.96\,\alpha \sqrt{\frac{1}{2(N-1)}} = \triangle$$

whence $$N = \frac{(1.96)^2\alpha^2}{2\triangle^2} + 1$$

of if we express $\triangle$ as a proportion of the true value, say E, the formula becomes

$$N = \frac{(1.96)^2}{2E^2} + 1.$$

To illustrate, if we wish to estimate a coefficient of variation to within E = .10 of its true value we would need a sample size of approximately

$$N = \frac{(1.96)^2}{(2)(.01)} + 1 \cong 193.$$

The above formula is for the case when the standard deviation is estimated by the root-mean-square method. A much more convenient method is by use of the average range. This method is particularly useful when the data consist of a number of relatively small sub-groups, say of 10 or fewer observations in each. Call the number in each group n. The range, R, is the difference between the largest and smallest value. The average range, $\bar{R}$, is the average over k such sub-groups. A factor, $d_2$, shown in Table 1, converts the $\bar{R}$ to an estimate of $\sigma$.

The formula is

$$\sigma = \bar{R}/d_2$$

When the coefficient of variation is estimated through the range method it may be shown that approximate 95% limits of sampling error are

$$\pm\frac{1.96\,\alpha\,(D_4 - 1)}{3\sqrt{k}}.$$

TABLE 1

Constant for Converting Average Range to Standard Deviation

| Sub-group Size, n | Conversion Constant, $d_2$ |
|---|---|
| 2 | 1.128 |
| 3 | 1.693 |
| 4 | 2.059 |
| 5 | 2.326 |
| 6 | 2.534 |
| 7 | 2.704 |
| 8 | 2.847 |
| 9 | 2.970 |
| 10 | 3.078 |

In this formula $\alpha$ represents the true (population) coefficient of variation. The factor $D_4$ depends on sub-group size, n, and is given in Table 2. This is the same $D_4$ used in control limits on charts for ranges. The quantity k is the number of sub-groups used in getting the average range, $\bar{R}$. Since in practice we would not know the true $\alpha$ in advance we would have to substitute the sample C.V. in place of $\alpha$ in this formula.

TABLE 2

Values of $D_4$

| n | $D_4$ |
|---|---|
| 2 | 3.267 |
| 3 | 2.575 |
| 4 | 2.282 |
| 5 | 2.115 |
| 6 | 2.004 |
| 7 | 1.924 |
| 8 | 1.864 |
| 9 | 1.816 |
| 10 | 1.777 |

For purposes of determining the appropriate sample size for estimating a C.V. by the range method we again assume a specified requirement of $\triangle$ for the width of the 95% interval

$$\frac{(1.96)\,\alpha\,(D_4 - 1)}{3\sqrt{k}} = \triangle$$

or if we express $\triangle$ as a proportion, E, of the true value of $\alpha$ this becomes

$$\frac{(1.96)\,(D_4 - 1)}{3\sqrt{k}} = E.$$

This equation has more than one solution since for any E it is satisfied by various combinations of n (sub-group size) and k (number of sub-groups). If n is specified we may readily determine k and vice versa.

Table 3 shows an evaluation of the left hand side of the previous formula for various combinations of n and k. The numbers listed in the body of the table are values of E expressed as percentages.

It is clear that quite large numbers of sub-groups are necessary to attain reasonably low values of E. It is also evident that a given value of E may be attained through several different combinations of n and k. The choice among these alternative combinations could be made on the basis of other considerations, e.g. cost.

TABLE 3

Values of Percentage Error in Coefficient of Variation for Various Sub-group Sizes and Number of Sub-groups

| | | | k | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| n | $d_2$ | $D_4$ | 5 | 10 | 15 | 20 | 25 | 50 | 100 |
| 2 | 1.128 | 3.267 | 66.2 | 46.8 | 38.2 | 33.1 | 29.6 | 20.9 | 14.8 |
| 3 | 1.693 | 2.575 | 46.0 | 32.5 | 26.6 | 23.0 | 20.6 | 14.6 | 10.3 |
| 4 | 2.059 | 2.282 | 37.5 | 26.5 | 21.6 | 18.7 | 16.8 | 11.8 | 8.4 |
| 5 | 2.326 | 2.115 | 32.6 | 23.0 | 18.8 | 16.3 | 14.6 | 10.3 | 7.3 |
| 6 | 2.534 | 2.004 | 29.3 | 20.7 | 16.9 | 14.7 | 13.1 | 9.3 | 6.6 |
| 7 | 2.704 | 1.924 | 27.0 | 19.1 | 15.6 | 13.5 | 12.1 | 8.5 | 6.0 |
| 8 | 2.847 | 1.864 | 25.2 | 17.8 | 14.6 | 12.6 | 11.3 | 8.0 | 5.6 |
| 9 | 2.970 | 1.816 | 23.8 | 16.9 | 13.8 | 11.9 | 10.7 | 7.5 | 5.3 |
| 10 | 3.078 | 1.777 | 22.7 | 16.0 | 13.1 | 11.4 | 10.2 | 7.2 | 5.1 |

## Sampling Errors In Multi-Stage Sampling

Earlier it was pointed out that special statistical analysis was necessary for the case where the sampling consists of selecting k packages (e.g. bobbins) and then taking n test specimens from each package. An analogy was made with stratified sampling in the social sciences. It is somewhat more appropriate in this connection to use the term multi-stage sampling.

With regard to the n tests from a given bobbin, we may think of these as a simple random sample from a population consisting of all of the yarn on the given bobbin. This population has a standard deviation which we shall call $\sigma_w$ for the within bobbin variation. It is generally a reasonably good assumption that $\sigma_w$ is approximately the same within each of several bobbins of a common yarn type made at the same mill under stable production conditions.

If all of the yarn from each of several bobbins were tested each bobbin would have an average value and these bobbin averages would be found to vary from bobbin to bobbin. We express this variation by $\sigma_b$, the between bobbin standard deviation.

If a single test specimen is taken from each of a number of bobbins then statistical theory predicts that the standard deviation of such a collection of data will be

$$\sqrt{\sigma_b^2 + \sigma_w^2}$$

If n test specimens from each of a number of bobbins are averaged the standard deviation of these bobbin averages would be

$$\sqrt{\sigma_b^2 + \frac{\sigma_w^2}{n}}$$

If we consider the grand average, $\bar{\bar{x}}$, of k bobbins each contributing n test specimens the standard deviation of this $\bar{\bar{x}}$ is

$$\sigma_{\bar{\bar{x}}} = \sqrt{\frac{\sigma_b^2}{k} + \frac{\sigma_w^2}{kn}}$$

We could have approximately 95% assurance that $\bar{\bar{x}}$ would lie within

$$\pm 1.96 \sqrt{\frac{\sigma_b^2}{k} + \frac{\sigma_w^2}{kn}}$$

of the true population (shipment) mean. Special warning is issued against a common error of treating the kn observations as a random sample of kn and assuming that the limits of error are simply

$$\pm 1.96 \frac{\sigma}{\sqrt{kn}}$$

where $\sigma$ is perhaps estimated from all the data lumped together. This is incorrect because, with respect to the bobbin-to-bobbin variation, which may well be as large or larger than within bobbin variation, the sample size is only k. To illustrate suppose $\sigma_b = 4$ and $\sigma_w = 3$ and that $n = 5$, $k = 20$. Applying the incorrect formula we would get $\sigma =$

$$\sqrt{\sigma_b^2 + \sigma_w^2} = 5$$

and

$$\pm 1.96 \frac{\sigma}{\sqrt{(5)(20)}} = \pm .98$$

for 95% limits of error on $\bar{\bar{x}}$. Using the correct formula the limits of error would be

$$\pm 1.96 \sqrt{\frac{16}{20} + \frac{9}{(20)(5)}} = \pm 1.85.$$

## Sample Sizes In Multi-Stage Sampling

The 95% limits of error for $\bar{\bar{x}}$ as given above may be equated to any pre-specified value, $\triangle$ and appropriate n and k found. Again this may be written in terms of within bobbin and between bobbin coefficients of variation and with $\triangle$ expressed as a percentage, E, of the true mean

$$\pm 1.96 \sqrt{\frac{CV_b}{k} + \frac{CV_w}{kn}} = E$$

Given E and n we can solve for k or given E and k we can solve for n. Clearly different combinations of n and k will lead to the same E and choice will have to be made among these on the basis of other considerations.

It is also obviously necessary to have prior knowledge of $CV_b$ and $CV_w$ to use the formula. The accumulation and publication of typical values of $CV_b$ and $CV_w$ for various characteristics (e.g. strength, count, twist) and for various yarn types is of considerable importance.

## Conclusion

In this paper only a few of the important sampling problems of the textile industry have been discussed. The author has attempted to present basic concepts connected with sampling rather than specific applications. A number of formulas for special cases have been presented; however, these have been given primarily to illustrate the general principles.

At the outset a distinction was made between "process control" sampling and sampling to determine the status of a given "population" of product. Through most of the remainder of the paper attention was concentrated on the latter type of sampling. Most of the general principles apply in both cases. The main difference in process control sampling lies in the use of relatively small numbers of items tested periodically and in the examination of the time sequence of results to discover instabilities caused by lack of adequate control.

# Quality Control In Warp Preparation

## QUALITY WARPS NECESSITATE GOOD PACKAGES, PROPERLY WOUND SECTION BEAMS AND GOOD SLASHING

**By W. B. CROXTON***

TO begin with, let's be sure we understand each other on the matter of executing or putting into effect the various aspects of the control of quality. In my opinion, it, of necessity, must be the function of line management or supervision to execute the various functions of the control of quality. The quality control supervisor, manager, or whatever title he carries, must restrict his activities to observing, testing, analyzing, studying and compiling facts and information so that he may make an effective presentation to line management as to what is wrong. In some large organizations the quality control personnel have very little or nothing to do with the technical or mechanical aspects of the job. In other organizations the quality control men apply their talents to the technical and mechanical problems as well as carry out the other phases of quality control.

In considering the basic essentials for good quality control in warp preparation, I feel it is essential that we consider at least three manufacturing operations:

(1) winding;
(2) warping;
(3) slashing.

I realize that each of these phases of manufacturing is a pretty involved subject in itself if it is to be explored thoroughly. On the other hand, good warp preparation really extends further back through the operations into yarn manufacturing and even to the specifications of the raw materials to be used.

In our discussion we will limit ourselves to the key points in winding, warping, and slashing. We will go into some detail on a few items that seem to be most important.

### Accurate Data A Must

Before we get into the technical aspects of these operations, let's discuss briefly the matter of reports that deal with end breakage and other problems that occur in manufacturing that might adversely affect the quality.

In each operation accurate processing information should be compiled to be used as a basis for analyzing the problems and determining the corrective action that should be taken. Some of this information can normally come from reports filled out by the machinery operators.

In other cases, it is necessary to depend on frequency checkers to compile this information. In most operations, the frequency checkers will be accumulating information for the industrial engineering or time study department. In cases where the time study department initiates the accumulation of processing data, the quality control personnel should consult with the industrial engineering department to be sure that the information is taken in such a form that it also can be used for tracing down quality problems.

The accuracy and terminology of all data accumulated is extremely important. The quality control men should work very closely with the time study department and their frequency checkers to be sure that yarn breaks are being properly identified and recorded. In the instances where this processing data is accumulated on a report form by a machinery operator, the quality control men should work very closely with line supervision to be sure that the operators are accurately recording the frequency and type of yarn breaks or other data pertaining to the making of good quality warps.

There are certain essentials for all of these reports to include: (1) the type of operation; (2) the date, time and clear identification of the machine or machines involved; (3) a complete identification of the yarn or yarns involved and the style; (4) an outline of the type causes for end breakage or other information that is to be recorded; and (5) the name of the operator and the frequency checker. These report forms will have variations from one mill to another according to the job conditions.

### Essentials In Winding

In the winding operation we can say that we have two basic essentials for this process:

(1) The building of a good package for trouble-free warping.

(2) A cleaning operation to eliminate objectionable yarn defects.

There are certain essentials of inspection and follow up on the quality of the bobbins coming from the spinning room which must be exercised. If poorly built or tangled bobbins are coming to the winding, this must be followed up with the spinning room supervision for correction. It seems that most problems arising from the spinning bobbin seem to come from excessive slubs, traveler cut yarn, singlings, sluffing-off and tangled yarn on the last yardage coming off the bobbin. All of these matters must be constantly followed up with the spinning room supervision in order to keep them at a minimum and under control.

Some of the features of making a well built winder package are as follows:

(1) The winder should be kept cleaned, oiled and in general good repair. The machinery manufacturer usually furnishes a good outline for oiling, maintenance and cleaning schedule. A careful evaluation of the job conditions will give a clear indication as to whether you should increase or decrease the frequency as recommended by the machinery manufacturer.

(2) Overthrows on the back of the cone should be avoided and this can be done by seeing that the traversing mechanism is in good mechanical order, that the yarn is being run with the proper traversing thread guide, that there is no malfunction due to lint or waste and the yarn has proper tension.

(3) The cone or the package should run in perfect align-

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ment with the roll or drum to avoid hard or soft noses or butts.

(4) All yarn contact surfaces should be perfectly smooth to avoid any cutting or scuffing of the yarn.

(5) Slip knots must be avoided. Knotters should be checked on a regular schedule to be sure the knotters are performing properly. Each operator should be impressed with the importance of getting any defective knotter repaired as soon as the trouble is detected.

## Slub Catching

The next item for discussion will require much detail but is an extremely important part of good warp preparation. This is the matter of slub catching or cleaning of the yarn. There are basically two types of slub catchers that are presently in wide use; (1) the fixed-blade type; and (2) the actuating-blade type.

In many instances the fixed-blade type slub catcher is entirely satisfactory. There are some basic considerations that must be taken into account in using fixed blades if you expect satisfactory results. Usually these blades are satisfactory where processing singles yarn of average or below average breaking strength and resilience. For instance, this blade gives better results on singles carded cotton yarns than it does on combed cotton yarns. It does a very poor job on most synthetics where the strength and resilience of the yarns are sufficient to pull small firm slubs or large soft slubs through the blades. Worsted mills have found this blade to do a good job on singles 100% worsted yarns but an entirely unsatisfactory job on Dacron and worsted blends. A comb is frequently used with the fixed blade to assist in catching some of the soft slubs and this is essential in many instances. The fixed blade was in use throughout the textile trade until the middle 50's on practically all of the Abbott, Universal and Foster winding. The Abbott winders still use the slub catching "blocks" which is the same basic principle of the fixed blade. Universal Winding Co. introduced the micra-set slub catcher with the actuating blade in the early 50's.

## Actuating Blade Slub Catchers

In the late 40's and early 50's a lot of thought and development work went into the development of a more proficient means of catching objectionable yarn defects. This development work pointed to the necessity of an actuating blade type slub catcher to meet the quality demands of the trade. The Barber-Colman spooler has for many years had an actuating blade principle in their snick plate slub catching device.

There are certain essentials that must be observed in using an actuating blade in order to obtain the most effective results. The sensitivity of the blade to be actuated must be carried as far as practical. To point up the importance of this, we have proven that the replacement of the standard thick blade that is furnished with the micra-set with a lighter blade made from .008" thick spring steel will give far better cleaning of the yarn even with a slightly wider setting. This basic principle gets back to some basic physics fundamentals in dealing with weight, speed and inertia.

The Barber-Colman Co.'s older snick plate uses a solid, heavy steel blade which has to be actuated in order to catch a slub. This blade requires a great deal of inertia for movement. Due to the demands of the trade brought on largely by the Dacron-cotton blends, Barber-Colman came out with a pressed steel blade to replace their solid steel blade to give more sensitivity and more proficient cleaning of the yarn. The first of these blades were sold to the trade in 1957 and at present are being used on about 25% of the Barber-Colman spoolers in operation. This new, more sensitive, light blade shows a great deal more proficiency over the older type heavy blade when running cotton counts in the range of 16s to 40s and particularly on Dacron-cotton blends. This more proficient cleaning can be achieved even with a wider setting which minimizes the danger of "rake-ups" or chaffed yarn.

Tests have proven that the sensitivity of the blade of the micra-set can be greatly increased by running the blade at an angle of about 78° to the line of travel of the yarn. In other words, the micra-set slub catcher with an angle of approximately 70 to 72° gives very good sensitivity. Experiments have shown that it is practical for most winding conditions to increase this angle to 78° and obtain greater sensitivity.

There is another basic type of actuating-blade slub catcher that is being promoted in the trade. This slub catcher has a knife blade that is actuated electronically. I have discussed this type slub catcher with several textile men but have never spent any time trying them or checking out the merits or demerits of them simply because I have found that the proper techniques in the use of a conventional actuating blade is sufficient to catch the objectionable slubs.

There is one other feature of the actuating blade type slub catcher that I would like to stress. When the proper techniques are used to obtain maximum sensitivity, good cleaning can be obtained without the necessity of settings close enough to "fray" or "scuff" the yarn.

We also must realize that the basic requirements of a fabric are going to be a big determining factor in how proficient a cleaning job is neccessary. I cannot visualize a situation where it would be practical to catch defects less objectionable than a knot. In fact, in some fabrics no cleaning is necessary and, of course, in some instances filling yarn is made on the spinning frame and goes directly to the loom without any cleaning at all. In these cases the warp yarns are usually not cleaned very thoroughly either. This same principle would apply to slub or nub type yarns in which the rough texture is desired for the fabric. In these rough textured yarns, however, we have found it essential to run these yarns through a McCall comb with a wide setting in order to pick up excessively large end piecings that have occurred in the spinning and might be objectionable in the fabric.

## Warping Operations

The basic function of this operation is to transfer the yarn from the winder package to the section beams. This, of course, requires that this be done in the proper arrangement of ends and the proper number of ends to make the warp for the loom. Basically, the ideal for this operation is to have every end in proper place all the way through the entire section beam as well as to have a section beam built so that it will run off in the slasher without giving any incident of trouble.

In my experience, lost ends and draw backs have been the most serious warping problems that have been encountered in trying to make a good quality warp for weaving. In most instances, I have found that ineffective stop motions and brakes have been at the root of most of these problems. When a warper tender has to scratch or dig into a section beam to find an end that has been buried, we normally can expect not only lost ends but a high frequency of draw backs at the slasher. There are three positions in which stop motions are used at the warper. (1) In the creel in the area of the thread guide and tension device; (2) drop wires at the front of the

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creel; and (3) drop wires at the warper head.

I have seen warpers with all three of these stop motions in use and yet the warper was giving a great deal of trouble with ends being lost on the section beam. In my experience, I have found that it is essential not only to have the stop motion at the front of the creel but to be sure that the stop motion is proficient and that the brakes are properly maintained to avoid an end being lost on the section beam. The Barber-Colman warper which operates at about 1,000 y.p.m. has the stop motion tied in with their drop wires in the creel. When these are properly cleaned and set up and brakes properly set, good results can be obtained.

## Drop Wire Stop Motion

In the case of cone type creels that we might refer to as "Cocker," we have found it best to mount the stop motion or drop wires at the front of the creel. The most proficient means of doing this is to use a regular electrode similar to that used on the Rhode Island stop motion on the loom. This uses the tapered slot copper drop wires. There are certain techniques in using this type stop motion that are essential in order to obtain the proficiency required for making good section beams. I will list several of these essentials:

(1) The drop wire should be as heavy as practical for the type yarns that are planned for production.

(2) The slot in the drop wire should give plenty of clearance between the drop wire and the electrode so that the drop wire will have no restrictions in falling, even under vibrating conditions.

(3) The rods used in front of and behind the drop wire to guide the yarn and to allow the yarn to hold the drop wire up should be positioned so that the drop wire stands perfectly straight up while the yarn is running. If the front bar is too far forward and allows the drop wire to lean forward in the direction that the yarn is running, the slot in the drop wire can bind on the electrode and cause slow contact action which might allow the broken end to be buried on the section beam.

(4) The guide rods should be set low enough so that the contact point on the inside of the slot of the drop wire is only about $\frac{1}{2}''$ above the contact point on the electrode. Quite frequently, in standard installations this distance is set up as much as $1\frac{1}{4}$ to $1\frac{1}{2}''$. Also, the guide rods are set in such a position as to allow the drop wire to lean forward and bind on the electrode. Usually, the drop wires furnished are much too light and the slot in the drop wire too narrow for good stop motion operation.

The brakes on the warper should be checked by some supervisory personnel at least once a week to be sure that the warper is stopping quick enough to avoid the end from going around the section beam. In addition to this, there should be a space on the warper report for the operator to make a notation of defective performance of the stop motion or braking mechanism at any time the condition is noticed.

Other items of importance that should be checked to assure good quality performance are as follows:

(1) Proper overhead cleaning should be installed to eliminate excessive accumulation of lint at any point that might interfere with proper tension or proper operation of stop motion. Also, lint accumulations that would tend to break loose and get into the yarn should be avoided.

(2) Consistent and uniform tensions should be maintained on every end.

(3) The expansion combs being used should be of a specification to have only one end per dent and no skip dents; unless, of course, a finer yarn is being warped with a heavy yarn and, in this case, the yarn should be laid in the comb to give the most even build up on the section beam. The expansion combs should be checked thoroughly to be sure that the dents per inch are consistent from one side to the other.

(4) Comb adjustments must be made to be sure that the edges of the beam are built uniformly and level with the main body of the beam.

(5) The press roll, or press drum, should be smooth and properly aligned to give equal and uniform pressure over the entire width of the beam. In case of drum driven warpers, the drum should have the proper surface on it to give proper protection to the yarn being run and the weighting of the beam should be equalized on both ends of the beam to be sure to get the same degree of compression across the beam.

(6) Section beams should be properly balanced for the speed at which the warper will run. The barrels and inside of the heads should be smooth so as not to damage the yarn in going on the beam or coming off. The heads of the beams should be in perfect alignment with each other and perfectly perpendicular to the center of the barrel. The journals should be perfectly straight and in good condition to properly fit the bearings in which they will run.

(7) The supply package holders in the creel should be perfectly aligned with the thread guide so as to assure minimum drag of the yarn as it comes off the supply package.

(8) The spacing of the supply package holders should be sufficient to give ample clearance when the full supply packages are put in the magazine creel and the space should be sufficient to allow for proper "ballooning" of the yarn as it comes off the supply package.

## Quality In Slashing

In slashing, proper plans should be made ahead of time to determine the proper size formula to use on new yarns, blends, and constructions. Where size formulas are already established, this is a routine matter of specifying a proven size formula on the slashing order. In cases of new construction or new yarns, several factors must be considered. Some of the most important factors are as follows: (1) the construction of the fabric; (2) the fiber content of the yarn; and (3) the count and t.p.i. in the yarn.

One good guide in determining the need for binding properties in the size formula is the hydroscopic properties of the fibers contained in the yarn. For instance, we know that viscose fibers have a very high standard moisture regain and fibers in the polyester family have a very low standard moisture regain. In general, the fibers with low moisture regain will require the incorporation of a better binder and a higher concentration of binding properties than for fibers with a high standard moisture regain. There have been many good synthetic binders introduced in the market in the last few years which have helped to overcome many sizing problems on these low moisture regain fibers. It is pretty well established at this time that Pearl starch converted on the Staley Mfg. Co.'s converter gives a better film strength in sizing than the high fluidity treated starches. We have also proven to our satisfaction that better running warps can be made with high melting point block wax than with the liquid waxes.

## Key Points For Slasher

Some of the key points to check on the operation of the slasher are as follows:

(1) The slasher creel should be in perfect alignment with

the size boxes, can section, and front of the slasher.

(2) The creel should have self-aligning ball bearings and should be mounted in an adjustable bracket so that each of the section beams can be aligned properly.

(3) Many mills have gone to the use of a reed at the back of the slasher and this reed should be in good condition and of a specification that would allow the ends to be laid uniformly for the full width of the section beams.

(4) The ropes used on the section beam heads for tension, whether they are made of nylon or cotton, should be of the same texture and should be of approximately the same age as far as wear is concerned. When it is necessary to change a rope in a creel, the rope used for replacement should be worn to about the same degree as those remaining in use. Many mills replace the whole set of ropes with new ropes when the wear becomes excessive on a few of the ropes in use in a creel. The older ropes that still have some good use in them are held back and used as replacements where it is necessary to make them.

(5) The weights used on the end of the ropes to give tension should be the same on all beams. The only exception to this would be where there is a special condition of yarn on certain section beams that are very easy or very difficult to stretch. In this case, it might be advisable to use less or more weight here to control the stretch on this yarn to the most practical level for good weaving and the desired results or effect in the fabric. Checks should be made to be sure that all weights are hanging freely so that they will be effective. The tension on the yarn should be decreased gradually as the set runs down. Each job should determine for themselves how this should be done.

(6) For the sizing of filament yarns, a single roll and single squetch size box usually is sufficient. In the case of singles cotton yarns and blends of synthetic yarns as well as blends of synthetic and natural fibers, it is usually more desirable to have the double squetch size boxes.

(7) In cases of heavy constructions or yarns that are very difficult to properly size, it is usually essential to split the yarn and run half through one double squetch box and the other half through a separate double squetch size box. Many mills have found it advantageous to split the yarn just as it enters the size to improve size pick up and penetration.

(8) It is essential that the cooking, storage kettles, size boxes and drying cans all have proper automatic recording controls. It is essential that the size boxes have size level controls. There should be no open steam coils in any storage kettles or size boxes.

(9) Rubber covered top rolls are pretty well established for most mills and those that are still using flannel or felt could advantageously go to the rubber top squetch rolls by trying the best of the rubber coverings that are presently available. In using the rubber covered rolls, it is essential to see that they are properly buffed and that the hardness of the rubber is maintained. This can be checked periodically with a densometer. When the rubber shows signs of a hard crust forming on them or a slight cracking condition occurs, the rolls should be buffed. If the rubber becomes too hard or softens up over a period of time, it will be necessary to replace this rubber in order to get the quality of sizing that has been established with the proper density.

(10) Pneumatically loaded top rolls have proven to be more satisfactory than deadweight.

(11) It is essential that both bottom rolls of a double roll size box be in perfect alignment with each other and that the circumference of each be exactly the same. If trouble is encountered in maintaining minimum desired stretch, do not take for granted that these two rolls are properly matched.

(12) Condensate traps and other condensate removal apparatus must be of sufficient size to keep the condensate removed from the drying cans even at peak loads. The condensate removal apparatus should be checked frequently to be sure they are operating properly. The steam supply lines to the slashers and the distribution lines to each drying can should be of sufficient size to supply enough steam to the cans at the peak demand for drying. Many mills are restricted in their capacity for drying due to their steam supply lines being too small or their condensate removal being insufficient. This seems to be an area in which it is necessary to go beyond engineering recommended specifications in order to be sure that the equipment is turning out all that it can.

(13) Many mills have found moisture control units to be very profitable. These were proven satisfactory for cotton slashing many years ago, but it has been only in the last few years that a satisfactory unit has been made for synthetics and blends of synthetics and natural fibers.

(14) In making a good warp for the loom, it is necessary that the loom beam itself be checked thoroughly to see that the loom heads are properly aligned with the barrel and that the heads are held securely in place. The barrels and the inside of the heads should be smooth to avoid any damage to the yarn.

(15) If a presser roll is used at the front of the slasher, it should be oscillating properly. This roll should have fiber discs on each end and any sharp edges or burrs should be polished down before using it on a warp.

(16) All warps, section beams and yarn packages should be handled so as to minimize the possible damage to the yarn and to minimize the amount of handling.

(17) The matter of split rods—the split rods at the front of the slasher should be smooth and cause very little friction on the yarn as it passes over and under them. The main split rod should be large enough to split the yarn without danger of ends breaking over. A larger main split rod is required on heavily sized yarns but the severity of the initial split can be minimized by a wet split of the sheet of yarn between the size box and the first drying can.

### Slashing Difficult Yarns

There are a few aspects of slashing very difficult numbers that I think might be of interest. In the worsted trade the air drying of the yarn at slashing has been recognized for many years as being essential for a good running singles worsted warp. In visiting some worsted mills in New England in the late 40's and early 50's, I found the mills were running their singles worsted yarns through two double squetch size boxes but instead of going directly from the first box into the second, the yarn was run up to the ceiling over a roll and back down again into the other box. This they called "skying" the yarn. It did allow some drying of the size film before entering the second box and seemed to give additional size pick up which greatly decreased end breakage in weaving. Some mills are reported to have carried this principle a little further by making a short pass through the dryer after passing through the first size box and then putting the yarn through the second.

The introduction of Dacron blends probably has caused more sizing problems in more places than any other one factor in the past six or seven years. The worsted mills have been better able to cope with this problem largely because their

slashing methods for singles worsted were not too different from those required for the Dacron blends.

I feel that we in the cotton and spun synthetics can learn a great deal from the methods we've just mentioned. It is not necessary to have an air dryer to gain most of these benefits. For example, if you wanted to do a good sizing job on a very difficult yarn, blend or construction, you could set up two 30" drying cans between the two double squetch size boxes. After the yarn passed through the second box, you could wet split and do some pre-drying with a battery of infra-red lights before the sheets of yarn were pressed together on the cans. The size film takes an awful "beating" as the yarn is being split at the front of the slasher. The wet split and predrying can minimize this damage by making it easier to separate the yarn after it is dry.

### Summary

In conclusion I would like to emphasize the importance of having a record of the defective warps, section beams, yarn or packages at each operation. The warper tenders should record the various causes of stoppage or poor quality work at the warper whether it be defective yarn, poor knots, poorly built packages or any type of defective mechanical condition. The slasher tenders and other personnel at the slashing operation should make a record of poor quality work showing up on the section beams. When practiced, this bad work should be shown to the warper tender that made the beam. The slashing personnel should also make a record on the slashing report of any trouble encountered that would give abnormal trouble in the weaving.

It is important that the weave room personnel show up any defective conditions in the warps that give trouble. A weekly report of the warps shown up should be made and this report should be posted in the slasher room for all the slasher room personnel to see. This report should show the style, warp number, set number, slasher number, slasher tender's name, the name of the weave room supervisor showing up the trouble and the name of the preparation supervisor to whom the trouble was shown.

In order to have an accurate follow-up, it will be necessary to have a ticket on each section beam and each warp showing the information necessary for follow-up. If this procedure is not handled in a practical manner, an awful amount of time can be wasted. It is important to keep this reporting and recording as simple as possible and that the personnel involved be thoroughly sold on the importance of it.

# Quality Control In Hosiery Manufacturing

## HOSIERY QUALITY CONTROL IS AIMED AT PRODUCING ITEMS OF SATISFACTORY QUALITY AND CONSUMER APPEAL ECONOMICALLY ENOUGH TO REALIZE A DECENT PROFIT

**By JAMES McDONALD***

QUALITY control in hosiery manufacturing is somewhat different from that which most of you apply in the manufacturing of yarns and woven fabrics. In hosiery we are dealing with an end consumer item. As such, each unit must represent a given quality level acceptable by the trade. Therefore, in hosiery quality control we must effect 100% inspection of the finished product where, with yarns, you conduct random sampling techniques and to a great extent depend on statistical quality control measures to do your job.

In effecting a sound quality control program in hosiery manufacturing, the task must begin with producer yarn and transgress throughout all manufacturing operations including throwing, knitting, greige operations and finishing. In each of these are, of course, several individual operations that must have quality control measures established and functioning.

In my remarks, I hope you will appreciate the fact that most of these procedures are based on experience with my company, Burlington Hosiery; however, every attempt will be made to generalize so as to cover concepts applicable to the industry as a whole. You will additionally realize that some remarks which I will make will be more applicable to a large organization than to the small and medium sized operations which are most prevalent in the hosiery business. The control measures, however, in general will apply to smaller producers, but may not be so wide in scope or all inclusive in nature.

### Organization For Quality Control

Since quality is a management function in any company it, therefore, is management's responsibility to set up an organization for quality control. This should be accompanied by having a staff officer responsible to top management only for quality control functions. Since research and development play such a vital role in any industry today, this area should also come under the directorship of this same staff officer. We take this position because we know that quality control is best assisted and prompted by a sound research and development program which involves machinery, development, process improvement and styling innovations.

### Definition Of Quality

Insofar as a definition of quality, we would like to emphasize that it is most difficult to give a clear, concise and accurate definition of the evasive term "quality." There could be any number of definitions with most of them being axiomatic in nature. We do know that quality is a distinguishing characteristic—whether it is applied to a tangible item such as hosiery or used as a connotation of the character of an individual human being. In Burlington Hosiery Co., we think of "quality" as being synonymous with "Industrial Character."

Since undoubtedly most of us are associated with companies which we feel have this mark of "Industrial Character," we must expound to great length on a philosophy of quality and might indulge in fantastic thoughts of it merely as a virtuous characteristic that is nice to have.

However, we cannot escape the fact that the reason for being in business is to make a profit. We might therefore say that our philosophy should be "to produce and market a product that insures satisfactory and appealing serviceability to the consumer, yet can be manufactured economically enough to realize a realistic profit."

In order to give you a better insight into the background of this particular philosophy of quality, it might be well to review the fact that in the manufacturing of any product there are varying degrees or levels of quality which might generally be classed as Superior, Excellent, Good, Fair or Poor. This is the point upon which a manufacturer's integrity is highly important—to classify products into these categories with proper regard to their end use.

There are, in hose, certain tangible characteristics which mark the goods as either Superior, Good or Poor, etc. The standards that are set for a product by a company establish the quality level. The interpretation of good or poor characteristics in hosiery is the floor on which a company's quality reputation is built.

As an example—it might be easy—and tempting for that matter—for us to say to ourselves that passing minor defects is okay. On the other hand, if we want to maintain our reputation, then we must take the position that these items are not satisfactory.

We might say to ourselves "Why—no woman will notice this—the stocking will wear just as well." But then we must ask ourselves the question, "Would I want to pay $1.35 for this item?"

How we in quality control set these grading levels and the degrees to which those manufacturing operations attain and maintain them then automatically sets the level of our industrial character. Obviously then, it certainly behooves any manufacturer to keep his reputation above and beyond reproach in order that he survive in the competitive field in which he participates.

A pertinent quote here might be "A good name is rather to be chosen than great riches." Certainly in any business, good quality is going to contribute both to good name and great riches. Quite naturally, we must, at the same time, be realistic in our approach and in the setting of standards. We must not set standards which are unrealistic to the point of sheer perfection in products; if so, costs could be prohibitive.

Here it might be said that "the highest exercise of the mind is good judgment." Naturally, we could lower quality standards thus get more first quality yield. Consequently—temporarily at least—we could expect to make more money; or,

*Field Representative, Quality Control, Research and Development, Burlington Hosiery Co., Burlington, N. C. Mr. McDonald's paper was presented before the Spring meeting of the Textile Quality Control Association held March 23-24 at Charlotte, N. C.

conversely, we could set standards so high that first quality yield would be so low that costs would be prohibitive.

These two forces, desire to get more firsts vs. good quality, constantly have to be evaluated by critical eyes. We must, therefore, set standards which are high, yet realistic. Quality levels and economics must be kept in proper balance. This should be the very important philosophy of any quality control organization and company "to make sure that quality levels are maintained that will insure satisfactory and appealing serviceability to the customer and consumer, yet be manufactured economically enough to realize a decent profit."

I might mention matter-of-factly that this has been impossible, of late, in some segments of the hosiery business, particularly full-fashioned.

### Definition Of Quality Control

An issue of American Society for Quality Control aptly defined quality control as "the science of maintaining Industrial Character." The fundamental concept of quality control is the basic idea of building quality into a product by maintaining a rigid set of manufacturing controls in every step of the production process.

### Functions And Responsibilities Of A Quality Control Research And Development Department

The broad function of any quality control, research and development department should be to guide the company in the maintaining of integrity of products consistent with economic conditions as they relate to the forces of competition. In order to accomplish this objective, we must be responsible to set up styles and constructions, grading standards, methods and procedures, followed by re-checking operations to insure compliance with issued directives and standards.

After a style and construction has been decided upon, construction details are given to the knitting departments. Grading standards for greige goods are issued involving quality standards for knitters and inspectors. Pairing and finished grading standards are issued to finishing departments. Line supervision and instructors are used to familiarize operators with standards. Finishing methods are specified to finishing departments. If the style involves a thrown yarn, then throwing plants are given instructions in detail as to all specifications for the throwing process.

With both methods and standards having been given by quality control, it now becomes apparent that we must see that they are applied as directed in the operations. Here we enter into the real application of quality control in hosiery. This is accomplished by having quality control personnel recheck behind operators in the plants and departments to see that proper standards are being applied. This should be accomplished on a random sampling basis with the operators neither knowing when they have been checked nor when they will next be checked.

Periodic reports should be rendered to plant and department managers indicating operators performance from the quality standpoint. Good and poor operators should be highlighted and this information used as applicable in their follow up with line employees. Quality reports should be issued by the quality control department to inform top management of quality levels by styles and plants. Based on quality report results, recommendations for improvements should eminate from all areas including any segment of manufacturing, management, technical personnel and quality control.

The quality control department should have a technically trained person make periodic plant and department visits to see that the proper methods and procedures are being followed and used. If they are not, management should be informed.

This same person should be responsible for trouble shooting, i.e., when a quality problem exists, find the source or cause of same, and recommend steps for corrective action. This would be true whether it be in raw materials, throwing, knitting, greige processing or finishing. This person should tie these various facets together in a technical sense, and where deficiencies in one are affecting another or the finished goods, suggest means of corrective action.

Might I add here that the quality program and follow-up should not stop with the finished inspected and paired stocking, but should include checks to determine correctness and neatness of packing and proper handling for shipment to the customer. Quality follow-up should also include such areas as checking on machine maintenance, yarn handling, employee's personal quality practices and continual wear testing of all styles being manufactured, as well as the conduct of wear tests on experimental styles. This would include fit tests for the purpose of setting length and stretch standards.

Quality control should also serve the function of answering all customer and consumer complaints as this is an invaluable gauge of customer and consumer acceptance and in many instances can serve to point out weak areas, particularly as regards fit and wear life characteristics.

### Control Measures For Quality Control

In order to fully cover the control measures taken for the controlling of quality, I will outline them as follows which will naturally be used by Burlington in its program. I will make these measures as general in terms as possible in order to cover half-hose, ladies' full-fashioned and seamless hosiery.

These measures would include:

(1) **Knitter Inspection**—which is that inspection performed by individual knitting machine operators on goods coming off their assigned machines and would entail their throwing out all knitter type defective stockings as well as waste goods.

(2) **Greige Inspection**—which is performed by greige inspectors to remove any knitter defects not thrown out by the knitter, looper or seamer defects, yarn defects or pull threads.

(3) **Greige In-Plant Quality Control** is performed by spot inspectors who serve as the individual plant's quality control personnel and report to plant management through a plant quality control supervisor. These persons perform around-the-clock spot checks on all knitters, inspectors and menders in the plant.

(4) **Central Quality Control** checks greige goods on a random basis taken from greige inventories at the hosiery plants. All plants and operators are covered on a periodic basis and reports are rendered to plant management, and if the occasion warrants, to higher level management. Central quality control in this greige re-checking would, of course, check for the items that should be removed by knitters and inspectors. As such, with a multi-plant operation, this serves to keep interpretation of grading standards at a uniform level. This function is also assisted by quality control field representatives visiting plants for co-ordination purposes.

(5) **Fabric Quality** in seamless is controlled by having fixers inspect goods off machines and make corrections for

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or printing
PASTELS
and
LIGHT SHADES...
ALGOSOL
water-soluble vat ester dyes
provide vat-dye permanence with direct application
ALGOSOL dyes are readily water-soluble and avoid time-consuming preparation...present attractive vat shades in simplified application...dye with superior penetration, levelness, and shade control...yield colorfast dyeings and prints.
Suitable for most types of dyeing equipment, Algosol dyes bring—to cottons, wools, rayons, and synthetics—outstanding vat-fastness to sunlight, washing, bleaching, and rubbing.
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ALGOSOL DYES, MANUFACTURED BY GENERAL ANILINE & FILM CORPORATION, ARE SOLD OUTSIDE THE UNITED STATES AND CANADA UNDER THE TRADE NAME "FENANTHRA" BY DISTRIBUTORS ALL OVER THE WORLD.

streaks or any other fabric deficiencies. As a further control, the quality control supervisor picks up one stocking from each machine at periodical intervals, tints these goods in a dark shade and observes for streaks or other fabric deficiencies. If a stocking from a machine is streak free the machine is reported as such and allowed to continue to produce. On the other hand, if a stocking from any given machine should happen to have a streak, then the machine is stopped, a red tag hung on the machine, and a fixer assigned to rectify the condition. After having done so, the machine may not be started in production until the red tag has his initials of approval certifying that it is streak free.

In order to keep top management informed on condition of fabric, each plant must periodically send one stocking off each machine to central quality control for evaluation. This is also accomplished by dyeing these goods in a dark color and evaluating for fabric conditions. The results are reported to plant management with other levels of management being advised periodically as to exact conditions.

In evaluating full-fashioned goods for streaks, a similar method is used. Also, the type streaks are reported as such; that is, rocker streaks versus other types. Included in this same evaluation would be indications of sleazy fabric, distorted stitches and several other type fabric conditions.

(6) **Length Control**—Seamless length control is performed by length control operators who check for length directly off the machines and make sizing adjustments therefrom. Recheck on length control is performed by central quality control by sets which include finishing the goods and checking for finished flat length conditions. Length control in full-fashioned is likewise performed by length control operators and rechecks by central quality control are handled similar to those for seamless. Results are reported to plant management. Rechecks are also made by central quality control on textile leg form using N.A.H.M. standards, being supplemented by a continuous program of wear testing by live models.

(7) **Seam Tests** are made bi-weekly by central quality control. Seams are inspected daily by the greige goods supervisor from each seamer in the plants. In effecting seam tests for all seamers bi-weekly, quality control has the goods finished and evaluated by a seam test operator. The seams are checked for stitches per inch, uniformity of stitches, seam size to include number of wales taken in seam, seam tightness, whether wavy and several other items. If seams fail to come up to standard for any item they are failed and show as such on seam test reports. These are reported individually to plant managers and show the per cent of seamers passing and failing.

(8) **Finished Inspection** is performed by pairing and inspecting operators in the finishing plants. These operators perform an inspection job to take out defects that were missed by greige inspectors, defects that would not be noticed by greige inspectors, any redyes, reboards, off color goods, pull threads, or runs that might have occurred in the finishing operations. These operators also pair and measure the goods to standards and tolerances specified by quality control directives.

Each finishing plant has located in it a section of central quality control composed of finished re-check operators. These operators are responsible to a central quality control staff member. They re-check goods from all pairers on a frequent basis with pairers knowing neither when they are to be, or when they have been, re-checked. Operators doing a poor quality job are re-checked continually until they come up to approved performance levels. Boxed stock is also checked by this same re-check section so as to hold transferring, folding and packaging quality in line. Reports are issued weekly to finishing plant management on type job being accomplished in these areas.

## Testing

As we mentioned before, testing is an important function of quality control. This would include two types of testing; namely, chemical testing and physical testing.

Some of the chemical tests that are necessary include oil and size tests on thrown yarns, spin finish tests on raw yarns, finish application tests on hosiery fabrics, dye indexes of yarns, sample dyeing, testing of dyestuffs, finishes, processing oils, needle cleaners, machine lubricants, trough solutions as well as several other items used in the manufacture of hosiery.

Some of the physical tests necessary to a sound manufacturing program would include strength, elongation and resiliency tests on yarns and fabrics, relaxation and shrinkage tests on yarns, twist checks, moisture tests, length tests, stretch tests, fit tests, burst tests, flex tests, snag tests, abrasion tests, pilling tests, shading tests, hosiery analysis, weight analysis of fabric as well as yards per pound tests for throwing cost control purposes.

## Pilot Plant Operations

Pilot plant operations are a vital necessity to a good quality control, research and development program. It will aid materially in the performance of experimental and development work in many areas including styling innovations, methods of improvements, machine improvements and improvements of existing styles. It should include a pilot plant model of all of the principal types of machinery used in the preparation of yarns, knitting of hosiery, and finishing.

## Summary

In summary, I would like to say that it has been a genuine pleasure to review quality control in hosiery manufacturing, dyeing and finishing with you today. Naturally, I have left out many of the details of this business of quality control, particularly as regards specific techniques; however, if there are any questions that you have, I will be happy to try to answer them now.

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# Georgia Textile Manufacturers Plan Annual Meeting For April 26-29

The Georgia Textile Manufacturers Association will hold its 61st annual meeting April 26-29 at Hollywood Beach, Fla., according to Paul K. McKenny, president of the association.

The convention will get underway with a welcome party and steak fry Wednesday, April 26. The first business session will be held Thursday morning, with a golf tournament scheduled for that afternoon. The final business session will be held Friday morning. At that time officers and directors will be elected.

Dr. George D. Heaton, industrial relations consultant from Matthews, N. C., will be the speaker at the convention's final business session.

The association has arranged a special convention flight leaving from Atlanta on the morning of April 26 and returning Saturday afternoon.

# Waste Control In Relation To Quality Control

## A WASTE CONTROL PROGRAM MUST BE DESIGNED TO REDUCE COST WITHOUT LOWERING QUALITY

By WILLIAM RAY*

YOU gentlemen will devote your time and talents at this meeting to the study and analysis of the many methods and procedures pertaining to quality control in your respective plants. The compiling of data, correct interpretation and presentation of this information to management is one of your most important duties. In order to discharge this responsibility in an effective manner, you must be keenly aware of all available tools designed to assist you in reaching your desired goal—a quality product at a competitive price for the consumers market.

Therefore, for a few minutes let us think together on the close relationship between quality control and waste control and the effects of one upon the other in the manufacturing processes in the textile industry.

The control of waste and the control of quality are so closely related that it is almost impossible to separate the two, because an adequate quality control program necessitates an emphasis on the controlled use of raw materials, and certainly a waste control program must be designed to reduce cost without lowering the quality of the product produced.

Quality has been defined as the degree of excellence an item possesses. In the textile industry, this degree of excellence of the finished product is determined by the specifications of the customer and the standards established by the plant. Let us consider how this manufacturing requirement affects the amount of material waste made—material waste being defined as that part of the raw material going into a plant which does not reach finished quality production the first time processed.

Some of the waste made is necessary in order to maintain quality, production and cost requirements, and is accepted as part of the normal cost of operation. Any amount of waste made which is over and above the minimum amount necessary to maintain these three manufacturing essentials is excessive waste. This area of waste lends itself to a waste control program.

Many aspects of quality are important in determining the amount of material waste considered necessary in producing yarn or a fabric from the raw materials. Two of the more important of these factors are the grade, staple and quality of the raw material, and the variety, type and quality requirements of the product produced.

### Waste Removal

Let us consider first the raw material in use. The natural fibers used in producing yarn or a fabric, cotton and wool as an example, reach the plant from their source of supply containing many undesirable items. For instance, in the case of cotton, there is leaf, stalk, bits of the cotton boll, dirt, short fibers, etc.; in the case of wool, the vegetable matter and dirt usually found in the fleece. This foreign matter must be removed in order to prepare the fiber for spinning. The cleaning waste classifications resulting from the removal of this foreign matter is greatly determined by the quality of the raw materials. The loss of fibers in the blending and cleaning processes of spun synthetics is dependent in a lesser degree upon the quality of raw materials.

Although the cleaning processes and the removing of foreign matter is necessary, it is a costly item in the manufacture of textiles and small changes in these volume waste classifications can cause terrific variations in the cost of waste in any plant. Therefore, quality control and waste control personnel should work closely together in order to insure that only the minimum amount of these waste items are removed in order to maintain the desired quality.

The second major factor affecting the amount of waste made is the type, variety and quality requirements of the finished product. An example of this factor is the difference of 10 to 20% made in combed and carded yarn. The variety of the fabric produced will affect the amount of waste made. Variety entails many counts, styles and colors in the cloth construction. It is easy to see that problems of mixing, handling and processing errors are multiplied, consequently more waste. Styling and variety bring to focus the differences in dyeing methods, for instance, package dyeing, stock dyeing and piece dyeing. Each process produces a different amount of waste. Variety of style and quality requirements will determine yarn waste necessary in weaving and the defects permissible, which in turn determines the amount of rags, short pieces, mill ends, etc., taken out at inspection and packing.

### Waste Dependent On Quality

Quality and waste are also closely related in the salable waste classifications, other than the cleaning waste items we have discussed briefly. Yarn waste in the various departments are affected by quality requirements. Spinning yarn must conform to a given tolerance as to counts; uniformity of yarn is essential; large packages are desirable and soiled yarn presents a quality hazard. Malformed packages may cause more breaks at spooling and winding. The conditions of the package in warper creels will determine not only waste made in preparing the section beam for slashing, breakouts, pull-overs, etc., but also the quality of the section beam for slashing.

*Waste Control Engineer, Southeastern Engineers Inc., West Point, Ga. Mr. Ray was one of the featured speakers at the Spring meeting of the Textile Quality Control Association March 23-24 at Charlotte, N. C.

Slashing will make thread in order to insure correct lay-ins, straight warps, proper size content, etc., for the loom beam.

Yarn waste in weaving is dependent to a large degree upon quality requirements of the cloth being woven. Bunch waste for protection against stripped quills, warp-out waste is determined by slashing start-ups, condition of yarn in body of loom beam and the requirements of cloth construction. Other filling waste will depend on size of filling package, correct taper, tension at winding, etc. The necessary amount of the waste made at the various processes is a joint responsibility of waste control and quality control personnel.

The testing lab also has a part to play in the control of quality and waste. The study and use of random samplings at the various processes in order to use the minimum amount of the stock for testing to check and control quality is worth considering. The placing of packages of yarn, or roving back into the flow of your stock as soon as possible is also essential.

### Waste And End Product

We have looked briefly at the effects quality requirements of the yarn or fabric produced have upon the amount of waste made in a plant. Now let us consider the effects waste has upon the quality of the end product.

Reworkable waste classifications, lap waste at pickers and cards, sliver waste at drawing and fly frames, roving waste at fly frames and spinning, and Pneumafil or spinner's lap waste at spinning constitutes a danger to efficient operations of your processes and consequently a lowering of uniformity and long run breaking strength of the yarn. Therefore, control of this waste is also vital if the quality desired is to be preserved.

The waste items just mentioned have been subjected to processes of mixing, cleaning, producing paralleled fibers, blending and preparing the fibers in a suitable form for spinning. The nature of these processes damage the fiber. Losses in the natural characteristics of the fiber, oils, waxes, etc., is expected at these processes. Splitting and breaking is common, and as a result yarns produced from these reprocessed fibers are lowered in quality. A predetermined amount of this stock may be added to the mixes and blends of the raw stock and continue to maintain the desired quality, but the amount used as reworked stock must be controlled within strict limits.

Reworkable waste can be compared to a rolling snowball. It continues to grow and grow in size. The more reworkable waste you make and use in your blends, more reworkable waste can be expected from picking through spinning, and so goes the endless cycle, more split laps, light and heavy sliver, uneven roving, more ends-down at spinning, more Pneumafil waste, etc.

### Summary

We can say at this point that it is evident that the quality requirements of the end product will affect the amount of waste made in a plant and certainly waste has a definite influence on quality. Therefore, it is essential that your waste control program be co-ordinated with your quality control program. Your production supervisors and production employees must understand this important relationship.

You gentlemen can play a vital part in your plants, as you use your knowledge and ability to co-ordinate the functions of these two control programs for your associates. Waste reduction and control, teamed with quality control offers one of your largest potential sources of cost reduction. Waste must be controlled if your plant is to remain competitive.

# Consumer's Viewpoint With Respect To Quality Of Purchased Goods

## CONVERTERS HAVE LEARNED THAT QUALITY CONTROL IN GREIGE GOODS IS ESSENTIAL FOR THE REDUCTION OF EXCESSIVE SECONDS IN FINISHED GOODS

**By PAUL KAUFMAN***

GENTLEMEN: As you know, I represent M. Lowenstein & Sons. We are described on our letterhead as a manufacturer of cottons and synthetics, which is a very short title for a fantastically varied converting operation. In the year 1960, the combined divisions of M.L.&S. produced in the neighborhood of 900 million yards of goods, which included prints, plains and yarn dyes of almost every known construction in cottons, synthetics and blends, in about every variety of finish known to the textile industry.

I won't take the time of this meeting to do a Lowenstein commercial, but I can assure you the company encompasses almost every fabric that can be woven or knitted. You can readily imagine with such a staggering variety of cloths passing through our finishing plants, how important quality control can be and how much thought, time and effort is expended on it by my associates.

Because of this awareness, I am most delighted to have this opportunity to speak to all of you men representing the greige mill area of our textile industry, as I feel we both suffer from what we might term a lack of communication. I think I am fairly representative of the New York converter, somewhat oblivious to the general aims, conditions and problems at the greige mill. And you gentlemen, representing the mills, may not be fully aware of the planning, processes, sales problems and end uses of the product you ship to us.

I think that by giving you a merchandiser's-eye view of our business, I will have communicated to you a broad picture of the merchandising and sales area with its effects on quality control, which may aid you at the mill level toward proper production of wanted merchandise through the understanding of its various end uses.

### Greige Mill Determines Quality

Some interesting statistics were reported to us this season from the finishing level of our company, which indicated that excessive greige mill seconds would also produce excessive finishing seconds. This seemed odd, but in checking back lot after lot, it was absolutely determined that those lots showing the greatest amount of greige seconds, applied or encountered, likewise showed the greatest amount of finishing seconds.

This is, of course, extremely serious, as the greige mill involved cannot be held responsible for finishing seconds, and yet a direct loss is attributable to that mill. We have been advised by finishing plants, particularly in the last season, that they find a given mill make to be best for a specified type of goods and suggest that we use that mill make wherever possible. We appreciate this type of guidance and try to follow through wherever it is feasible.

A specific case occurred a few months ago where we were using four different mill makes for a plain-dye combed number at our Lyman (S. C.) Division, where we continually process several hundred thousand yards a week. Our quality control advised us that one mill make was superior to the other three and as a result, we have swung a great deal of additional business to that mill and have curtailed our purchases from the others.

Here we have a very concrete example of how proper quality control at the greige mill can mean increased sales and even increased prices for the specific mill product. I am sure that this type of situation has occurred at our own and other finishing plants throughout the country and that other converters are being influenced by this type of information.

This points up one of the most important aspects of quality control from a converter's standpoint, which is that any given mill can and will make imperfect goods. However, these goods must be separated on the strictest possible basis.

### Finished Seconds Expensive

The smallest loss is encountered when goods are caught at the greige mill. These goods are earmarked and sold at a discount. A much greater expense is incurred when defective goods are detected at the finishing plant, as they have been processed in one or more degrees, and this additional cost is usually charged back to the mill. The greatest losses by far are encountered when these damages are found in garments. It has been our experience on many a sad occasion to have paid out monies far in excess of the total cost of the greige goods and the finishing. However, in many cases, no amount of money would have compensated for the damaged reputation of the manufacturer and retail outlets involved, to say nothing of the reputation and business relationship of the converter to the manufacturer.

The grading of goods from a merchandise point of view can often be quite different from the mill method incorporating the Worth Street Rules. In many situations, excessive minor damages can be covered by bleaching white or dyeing into black, but a continuous warp streak or temple mark can render an entire length useless. Again, many defects, major and minor, in a large piece might be cut out and the resultant firsts used in over-the-counter goods where shorter lengths are sold, whereas again, a continuous defect would render the same goods unmerchantable from a first quality standpoint.

*Vice-President, M. Lowenstein & Sons Inc., New York City. Mr. Kaufman's paper was presented at the Spring meeting of the Textile Quality Control Association held in Charlotte March 23-24.

I think that the finishing area alone exerts the strongest pressures due to the tremendous strides made in the past few years by the use of various resins and more recently by the use of chemicals inducing molecular changes in fiber constructions. As an example, fiber reactive finishes cause severe degradation of the cotton and will adversely affect the tensile strength of the fabric to a very great extent. Obviously, many fabrics perfectly suitable for Sanforized and wash-and-wear finishes can become a tender goods problem as a result of a fiber reactive finish. Therefore, many market constructions, because of their great tensile strength, will find their way into dyeing and printing for these special finishes, where there has been little or no previous experience for better garment use. This can lead to many complications as the quality standard of the greige goods may have been perfectly permissible for the original end use intended, but far less than satisfactory for use in the fine garment manufacture.

This also occurs quite often when fashion dictates the use of cloths very much afield from their normal manufacturing use. Textured cloths, such as osnaburgs, enameling ducks, drills, sheetings, etc., are being used extensively for better-priced garment areas, where obviously the quality standards may be quite different from those normally accepted in the trade.

The converter may assume, perhaps erroneously, that the mill knows that "Cloth X" is going to be a big item in a specific type of garment. The mill may also erroneously assume that the converter knows the limitations of the fabric involved and would never dream of using it for that item, and both parties then come to grief. As the greige mills become aware of what may be demanded and expected of a given cloth, they can then educate their sales departments to its peculiar specifications and those sales departments in turn educate the converter and the merchant so that the fabric is used with the proper finish, for the proper end use.

## Requirements For Finished Products

Every area of garment manufacture has its own requirements and specifications to insure proper quality in their finished products. Swimwear manufacturers require a degree of sun-fastness, salt water and chlorine resistance, wet strength and seam slippage, to name a few, not normally found in other phases of ready-to-wear. Active sportswear, currently a tremendously important segment of garment manufacture, requires resistance to seam slippage and tensile strength far in excess of other type garment manufacturers using the same fabric but having little problem of stress and strain. In addition, there is often a demand for opacity, particularly in white, by sportswear people, which is not at all required by dress manufacturers.

Generally, quality and appearance of a fabric can be acceptable or unusable, depending upon the season. For instance, an excessively reedy broadcloth, unusable as a white or light-ground spaced print in the Spring of the year, would go undetected as a dark, well-covered pattern in the Fall. A cloth with a neppy condition might go undetected as a scattered white-ground print, but could show as an absolute second in a spaced blotch.

## Different End Uses

As you probably know, many of the same greige goods, such as 80 squares, 109x58s, or 136x60s may end up in anything from a $2.98 house dress to an extremely high-priced cocktail dress. The expensive garment may never be subjected to more than a single dry cleaning. The inexpensive one may be washed dozens of times, subjected to the most caustic solutions and severe abrasion. Here again, the same cloth perfectly satisfactory for the better garment is ironically less than desirable for the cheaper end use. It is so often the case where inexpensive goods produced in garments expected to give week in and week out service through the years, must be better constructed, printed and finished and even sewn to withstand those rigors than the more expensive, worn only occasionally.

Since you are all aware of the myriad end uses of all the carded and combed constructions in ready-to-wear, it is safe to assume that a high quality standard must be established encompassing all fabrics' uses in garment manufacture, because in today's market they are so readily mixed. Just think, 78 squares are being used daily in the manufacture of $25 dresses and in many cases, much higher. Add all the other fabrics which are now used in dresses, sportswear, beach and playwear and home furnishings, to name a few, and you can well imagine the quality problems that are and are going to be encountered.

Finished goods with excessive greige defects can cause grief in fantastically varying degrees depending upon the cutter to whom it is shipped and the size ranges he makes. Cut-outs may be minor in small-sized children's wear and absolutely major in large-piece dresses. Not only are the cut-outs themselves more obvious and larger, but the overlap on the cutting table may require several yards, depending on how it falls in the pattern. The lower-priced cutter may pass many damages which the more meticulous manufacturers generally consider unusable. Since there has been a great trend throughout the garment trade toward upgrading the product price-wise, the ramifications resulting from damaged goods are going to have a more serious impact than ever before and are certain to be much more costly. It becomes apparent that this upgrading alone will necessitate quality control at the mill and finished goods level in excess of today's standards.

## Finishing Operations

Let's take an imaginary bale of goods and follow it from the time it leaves your mill until it is spread on the cutting table of a manufacturer and finally sewn into garments and hung upon the rack for sale.

However, before we start, let us remember that greige defects are often latent and cannot be detected during normal finishing operations. Even patent defects, unless glaring, cannot be detected in the greige room and must be caught in the cloth room at the mill.

Finishing plants, in general, assume that the greige goods they process have been properly inspected and do not accept responsibility for greige inspection before handling the goods. Therefore, we are almost completely dependent upon the greige mill inspection standards before we invest the finishing costs.

Most of the finishing plant operations are in rope form until they reach the dyeing or printing stage. When the bales arrive at the greige room of the finishing plant, they are of course opened and sewn together, and at this stage, only short-length pieces and glaring faults, such as holes and tears, can be found. The goods are then singed and de-sized, which is a process much too rapid to spot or even look for damages. The greige goods, now in rope form, are then bleached and mercerized, and this is about the first point in the operation

where a defect such as tight selvages would be encountered. The goods are then dried at full width and put on rolls of 1,000 yards and more, all at very high speed, where only the slightest examination is plausible. They are then dyed or printed, and here as the goods go through the print machine or come out of the dye machine, does the operator have his first opportunity to scan the cloth at anything approaching average speed, and even this is casual, as it does not and cannot resemble a thorough inspection by a trained operator. Here, in plain dye particularly, can we first detect warp streaks, filling bands, or unevenness of yarns, temple marks, and normal weaving defects. At this point, practically all of the finishing applications have been made, other than resinating or Sanforizing, schreinering, etc., and about the only savings that can be made on greige mill seconds would be to eliminate this finishing operation and use a plain mill finish. In many cases, this is not practical, as the goods, even finishing seconds, sold in a finish other than that for which they were originally intended might not bring much of a price at all.

Let's take a length of goods going through an embossing machine, which is probably the slowest-running unit in the plant. Here the operator discovers weaving defects which he has come to expect as normal, as there is rarely a perfect piece of goods, but does nothing to stop or even slow his machine. It is only after watching hundreds of yards run through that he realizes this length has more than a normal amount of weaving imperfections and he may advise his supervisor accordingly. He in turn will earmark this for more careful scrutiny at the inspection table.

As you can see, unless a defect is blatant, greige mill seconds can rarely be caught in the finishing plant short of the inspection table, and as a result, all of the processing has already been done, the cost of which often cannot be recovered.

## Defective Materials

Generally, the things that we look for in the finishing plant area which cause the greatest amount of seconds are substandard tensile strength, tight selvages, thick and thin spots, reediness, filling bands, temple marks, excessive neppiness, excessive mill oil, and general uncleanliness. Of course, latent defects cause immeasurable trouble since they become apparent only after processing.

One important cause of a latent defect is the amount of tension that is normally exerted at the finishing plant, which is often far in excess of any tension that the cloth may have experienced in its weaving stage. Here weak spots in the selvage come up, which are not detected in weaving. Also, goods that have been spot washed for mill oil or other reasons at the greige mill will not show up until after dyeing, where they usually will cause resist spots, and the cloth will not take the full dye.

Once the manufacturer receives his finished goods, we may encounter the most serious problems of quality control. I will not attempt to cover the finishing area in this relationship but just try to enumerate the problems engendered by bad greige goods.

Firstly, excessive weaving defects—hanging threads, slugs, smashes, etc.—will necessitate cut-outs. These are not only costly because of the lost yardage, but even more so as a result of lost time in making these cut-outs. Warp streaks and temple marks will cause the entire piece to become uncuttable. Filling changes and filling bands will result in shading, rendering most goods unsalable. I have personally examined many yards of shaded goods which were unnoticeable until stretched horizontally on the cutting table.

Nowadays, almost every production man in a garment plant keeps a record of the mill make (seller), yardage, cut-outs, time to lay up and other pertinent data. A bad shipment will often result in an adverse report from the production man to the piece goods buyer and a converter will have difficulty in reselling the account. More often, the manufacturer will tell his story to his customer—a large chain of stores or a buying syndicate—and a converter will be branded as an unsatisfactory supplier of a given cloth. Worse still is the attitude of a production man receiving a second shipment from a converter having a poor quality record. This man is looking for trouble and will be unusually critical in his appraisal of goods. It is therefore obvious that control, real quality control, must be exercised right at the source, at the greige mill.

## Conclusion

Gentlemen, I have attempted to cover many areas of quality control in greige goods as it affects the converter. Obviously, this subject is vast and countless examples might be cited. However, I think the focal point, or moral, is that quality control must be exercised to the fullest extent at inception. Fine quality is all important and will become even more so at every garment price level in the months to come. As new finishes are introduced bringing additional costs; as sewing costs rise; as fashion dictates higher and higher styling, the fraction of a cent saved by purchasing borderline quality will become less and less meaningful. The public wants style and quality and they are going to get it. Price is important, but not at the expense of the end product. As the converter is made to recognize this importance, he will demand continuity of the quality mill product. And may I add that many customers have already inquired as to the greige goods source, and other retailers and manufacturers already recognize certain makes as premium.

It may interest you to know that many customers before placing an order will inquire as to the source of greige goods and some will even specify a known quality mill make in their purchase contract. Again, the converter may use the name of a mill make recognized for outstanding quality as part of his sales talk in securing his order.

I hope I have made clear in citing these many facets of the converting and finishing operations the tremendous importance of quality control in the greige product. Starting out on the right foot is all important in any undertaking and the use of quality greige goods at the inception of the converting operation is paramount.

# N. C. Industrial Safety Conference In May Will Include Meeting Of Textile Section

The 31st Annual Statewide Industrial Safety Conference, sponsored by the North Carolina Industrial Commission, will be held Wednesday through Friday, May 10-12, at the Jack Tar Hotel in Durham, N. C.

Of particular interest to textile representatives in attendance will be a meeting of the Textile Section at 2:15 p.m. on Thursday, May 11.

Copies of the full program and information concerning registration for the conference can be obtained from H. S. Baucom, director of the Safety Division, N. C. Industrial Commission, Raleigh, N. C.

# Quality Control In Dyeing And Finishing

## DYEING AND FINISHING HAS BECOME AN INCREASINGLY COMPLEX FIELD, REQUIRING CAREFUL QUALITY CONTROL

**By WALTER T. HOLLIDAY***

WHY is color so important? How are so many people today earning their livelihood in manufacturing it, in testing and controlling its manufacture, in applying it to textiles, to ceramics, to buildings, to paintings, etc.? Why are you today trying to learn more about controlling its quality?

I do not know all of the answers, but this I do know:

God recognized the value of color and color contrast when he created earth. He gave people eyes to see it, and a mind to admire it, and to be thankful for it.

Without color contrast, you would not be able to see. You would not be able to distinguish objects from beings, nor beings from things. You would not be able to distinguish your wife from your dog, nor your dog's head from its tail. In general, things would be in one "heck of a mess."

### History

Before we start into the specifics of what can be done and what is being done in the modern day textile plants in the way of quality control in dyeing and finishing, let's look back into the history of this vast and competitive business with which we are so vitally concerned.

It seems as if what is today our modern organic industry was founded by a young Englishman by the name of Sir William Henry Perkins.

Sir William Henry Perkins was born March 12, 1838, and died July 14, 1907. From this we see that he lived 'til the age of 69.

Looking further into the life of this man, we find some of the little known facts about him, his works, and his accomplishments:

(1) Perkins did not graduate from college and his degrees were all honorary.

(2) He became interested in chemistry somewhere between the ages of 12 and 13.

(3) The first of the azo dyes ever manufactured, the first artificial coloring ever to be discovered was credited to Sir William Henry Perkins. This dyestuff had short acceptance; probably due to the fact that later Perkins commercially produced mauve (mov), a name given to his dyestuff by the French who were the first to recognize its commercial value. Mauve is a delicate purple, violet or lilac color, which when applied to cotton by means of mordants, gave excellent fastness. This was the beginning of the great dyestuff industry whose source is derived from coal-tar.

*Supervisor of Fabric Development, Research and Development Division, Riegel Textile Corp., Ware Shoals, S. C. Mr. Holliday's paper was a feature of the Spring meeting of the Textile Quality Control Association held March 23-24 at Charlotte, N. C.

(4) Perkins was 17 years old when he discovered mauve. He encountered difficulty when he searched for someone to finance him and turned to his father, who was a carpenter, and who had no knowledge of chemistry.

(5) Perkins, with financial assistance from his father, erected his plant and enjoyed approximately 10 years of success. His discovery, derived from coal tar, led to many other discoveries by others and the newer discoveries were brighter colors, though not as fast as mauve. Perkins' fast colors soon gave way to the newer brighter colors and he was face to face with stiff competition. He was able, by improved methods over those proposed by his competitors in manufacturing their products, to keep his business going. However, at the age of 36, being able to retire modestly, he devoted the remainder of his life to pure research.

(6) He was the first to produce compounds by synthesis—putting together two or more unsaturated solutions into a whole.

Another person who played an important role in this textile business of ours was Thomas Cooper, who died in Columbia, S. C., in 1839 at the age of 81.

His major accomplishment was not related to dyeing, but how can you think of dyeing without first thinking of the preparation of textile fabrics for dyeing? They are as closely related as cornbread and black-eyed peas.

Cooper was an Englishman, an Oxford graduate, the second president of the University of South Carolina. He was the first to make use of chlorine as a commercial bleach. Before this time fabrics were bleached by alkaline boiling, exposing to the sun, neutralizing with a dilute acid or sometimes sour milk, rinsing and repeating until the proper bleach had been obtained. You can readily see the importance of Cooper's contribution when you think of the time and effort he had saved.

Scheele discovered chlorine in 1774.

Cooper became too friendly with the French during the French Revolution and was ousted from England. He came to America with his friend Joseph Priestly, the discoverer of oxygen.

Cooper was a man who was never afraid to speak his convictions and because of this he was fined and jailed in Philadelphia for libeling President John Adams. He was an educator in chemistry. He later became president of the University of South Carolina. He was a pro-slaver and took a big interest in states rights. He, not Lincoln, was the first to say, "The government of the U. S. is the government of the people and for the people."

Another man who contributed much toward the success of our business as we know it was Michael Eugene Chevreul. His contributions were in the field of chemistry, dyeing, and


THE UNTOUCHABLES
(audio) No one can touch Butterworth
(audio) when it comes to solving dilemmas
(audio) in synthetic fiber production.
(audio) Butterworth investigates the problem
MORGUE
(audio) and uses research and experimentation
(audio) ...consults with chemists and dyehouses
(audio) and demonstration plants . . .
(audio) to improve traditional methods
BANK
(audio) or find new techniques
(audio) that mean fast, low-cost
(audio) fiber production and finishing.
(audio) Then, Butterworth engineering and experience
(audio) starts building a machine or complete range
(audio) that eliminates the trouble.
(audio) If you're in a jam...
(audio) Buzz Butterworth! (Waverly 7-1020)

the science of color. He studied the effect of heat, light, water, oxidation and other reactants on dyed fabrics. His greatest works concerned fats, simultaneous contrast of colors, and the application of chemistry to dyeing and color vision.

He first said:

(1) The basic colors are red, yellow, blue, orange, green, and violet. (Today the basic colors are considered to be red, yellow, and blue). They can be modified by one of four ways.

a—by the addition of white;

b—by the addition of black;

c—by the addition of certain colors which change the specific property by dulling; and

d—by the addition of certain colors which change the specific property without dulling.

(2) Placing two colors of different tones next to one another lightens the tone of the darker and lowers that of the brighter.

(3) If two colors complementing one another are placed together, the tones of each are brightened.

(4) When two colored objects are placed next to each other, each loses its own color and takes on a new, which is due to the color being modified by the complimentary of the other.

Active almost until his death in his scientific activity, Cooper died in April of 1889, just before the age of 103.

The early American independent dyer of the early 19th century enjoyed high prices per linear yard but had extremely short runs. Black and browns were the popular colors with occasional orders for blues and greens. They enjoyed such prices as 15 to 35 cents for the black and brown and 11 to 30 cents for their blue and green. Each order rarely exceeded 10 yards and most commonly ranged between ½ and 2 yards.

Their pay was usually on the barter system and discounts were given for cash payments. Within six months was considered as being cash.

By mid-19th century, we find that most of the small independent dyers were dissolved and we had instead the professional dyer who worked for the large commercial establishment.

## Wool-Cotton Blends

By this time competition was becoming somewhat of a problem and we find that wool contained a percentage of cotton. This was not being done for quality, comfort, or to improve any physical properties but rather to decrease cost.

The dyers who found themselves faced with dyeing blends termed this dishonesty and some wrote public articles proclaiming it as such. It became such common practice to blend cotton with wool until sometime later a bill was introduced and passed which was known as the "Wool Fair Labeling Act."

Since that time we find that greater and greater competition is facing us—both domestic and abroad. We find that newer synthetic fibers have come on the market and, even though the first, known as "artificial silk" (rayon), was made to resemble silk and to sell for a cheaper price, they are an integral part of our every day living. Synthetics, cotton, and wool fabrics all share their part in our textile economy and blends of these fibers enhance the other when blended correctly and are no longer looked upon as being inferior because they lower the price of the fabric.

Statistics taken for the season-ending 1959-1960 show:

(1) The synthetic industry is 50 years old. Rayon was produced in 1910 in Marcus Hook, Pa., by a subsidiary of Samuel Courtauld & Co., a British firm.

(2) There are 21 man-made fibers on the market.

(3) 27.1% of all textile fibers produced in the U. S. are man-made.

(4) Cotton accounts for 61% of the textile market.

(5) 81% of cotton consumption is for apparel and household textiles.

There is no question in my mind but that the textile business is an ancient one. There is no question but that it has quite a future in store for those who are alert, those who are really on their toes, thinking, planning, dreaming, and working within their organization as a team for the maximum in efficiency, keeping in mind the performance of their product at consumer level.

Some feel that the trouble in textiles today is that the supervisory level has been and is filled with men who have been selected and promoted through a process of seniority rather than men with imagination, technological, or engineering skills. These are the men who can face the competition bravely, both foreign and domestic.

If a product is offered, it can be controlled. If it's worth using, it's worth controlling.

Not long ago, I read where punch-card control of the dyebath is now in use in England. This controls everything from water inlet to finish feed. This article reported that "reproducing acceptable shade on repeated dyeings is said to be good."

## Steps For Quality

There are, in my opinion, two types of quality control in finishing: (1) in process control; and (2) product control—checking results obtained as to how it affects the product at intervals throughout processing prior or subsequent to a given operation.

It's awfully hard to think of one without respect to the other as both are for one common purpose—achieving the best possible results with the objective being quality.

There is one basic difference, however, and that is the process control leans heavier toward the company with maximum efficiency and the best possible reproducibility in mind, whereas, product quality control is interested in quality without too much concern as to how it is achieved.

There is no question but that the ideal dream of the future for in-process control is complete automation. Now we all know that this is not probable in the near future but nevertheless, it is a goal to work toward. Wherever an instrument can be installed to control the feed of a chemical or dyestuff, or for the temperature of a bath in the finishing process, there is no doubt but that it is a good investment from a quality view.

Whenever instrumentation is not practical, it is a good policy in in-process control to establish upper and lower limits within which a chemical or temperature should vary and by means of titrations, etc., keep a graphical record at definite time intervals of the steps you are trying to control. These records or charts should be checked by plant supervisors and by someone from the quality control department each day to establish uniformity of runs.

## Control Of Wet-Processing

One important thing to remember in wet-processing is that every yard does not have to be perfect in its preparation for dyeing and finishing, but once a shade or finish is established, the method employed to achieve that result should be set as a standard and the control for that shade and finish should

not vary beyond reason on repeated runs. As an example, goods prepared for dyeing a sulfur black do not require as thorough bleach as do the same type goods being prepared for dyeing into a pastel shade.

Four important steps to remember in achieving best possible quality in wet-processing are:

(1) Use the best available chemicals and dyes. Do not switch products until the substitute has been thoroughly checked as being a competent replacement for either price or quality.

(2) Keep up-to-date equipment.

(3) Maintain step-by-step process control.

(4) Establish laboratory control to strictly double check plant results.

American consumers are becoming more quality conscious. A recent national survey made among retailers and consumers show that most of their complaints pertaining to wash-and-wear cotton fabrics are: (a) lower abrasive resistance; (b) lower soil resistance; (c) an unsatisfactory level of wrinkle resistance, both wet and dry, and lack of durability for the life of the product; (d) low tensile strength; (e) fabric yellowing or strength loss; (f) a reduction in comfort qualities; (g) poor hand and drape; and (h) odor.

While most of the above problems do not exist in quality finishes, too many people associate the disadvantages with all chemical finishes.

From the disadvantages listed above, you can add two things to the list for significant qualities—color fastness and dimensional stability.

## Up-Date Methods

Too often emphasis has been placed on price rather than quality.

In spite of all the complaints, the demand is continuing to grow for ease of care fabrics. The present demand well exceeds 50% of all textiles and there is no doubt that this accounts for all the research and study going into means of acquiring better, more durable finishes.

There is an urgent need for textile manufacturers to cooperate in meeting and developing consumer demand for higher quality.

An instrument that is coming into use today for the purpose of checking incoming colors and establishing new color formulas is the Colorimeter. It also may possibly be used on border-line cases in the dyehouse to assist the dyer in determining whether the dye formula needs a pinch of yellow, blue, or red or conceivably could be used by quality control men to assist them in arbitrations as to whether a shipment is a fair match to a given standard. Our chemist, who is presently checking out one of these instruments for possibilities, is very hopeful for its future use and reports that it is saving considerable time as an aid to matching shades in the laboratory.

I do not need to go into detail in regard to the necessity of keeping modern up-to-date equipment. There is certainly no one present whose company is not continually pouring a percentage of their profits back into their organization each year for improvements in methods and equipment. Failing to do this would, in effect, be the same as taking water away from the roots of a tomato plant. While the tomato plant would die quickly, a textile plant would be faced with slow but sure death.

The controls that should be exercised in wet processing are:

(1) Check tensile and tear strengths of the greige fabrics before processing. This is extremely important for those who are doing commission finishing and in lieu of growing consumer demand for wash-and-wear.

(2) Check alkalinity of caustic or alkali during boil-off before bleaching by periodic titrations.

(3) Check bleach bath by titrations periodically so as to maintain level oxidizing power and level buffering action.

(4) Mercerization should be under automatic control in reference to the Twaddle of caustic solution and goods should be washed free from caustic at exit end. If the caustic is not completely removed there is danger of fabric degradation due to the oxidizing power which caustic contains when exposed to heated atmospheric conditions.

(5) Fluidity checks should be performed after bleaching to determine the degradation incurred in bleaching.

(6) Absorption checks should be made on bleached fabrics since all will be offered in whites, or dyed colors, and excess variation in absorption can affect the printing, the dyeing, and/or the finishing.

(7) After bleaching, a reflectance test should be performed on the fabric. This measures the degree of whiteness obtained. The need for this test can be readily seen when you realize what effect the difference in whiteness has on pastel dyeings.

(8) In vat dyeing the basic steps are: padding on color, drying, reducing, steaming, oxidizing and soaping. Of these, the most critical point is the reduction in the chemical pad containing caustic and hydro. The alkali should be checked periodically by titration and the reduction potential of the hydro can be checked by multi-volt readings. This is one point where it would be of definite advantage to control by instrumentation.

## Summary

In the dyeing of fabrics it is necessary in addition to using competent dyestuffs and controlling the process during the dyeing cycle to control the weighing of dyestuffs to the most minute detail. At best conditions there is a human error to contend with but this cannot be overlooked.

In finishing, care should be taken to keep the filling of fabrics as straight as possible. Wherever possible automatic filling straighteners should be used. Chemicals should be weighed precisely. Use of predryers should be employed to cut down on resin migration. The finisher and those responsible for finish formulation should keep in mind those items given previously pertaining to odor, strength, abrasion resistance, crease resistance, dimensional stability, etc.

Quality control should have some one designated to double check quality before fabrics are shipped to an intermediate prior to being tested by the consumer in actual wear.

Quality is a measure of class; control is to regulate; and success is a measure of your ability to operate at a profit. To continue operations you must promote your items, you must price them in a bracket that the consumer is willing to pay and your items must perform at such a level that you will receive repeat orders.

Remember! The cheapest promotion for a company is a name that spells quality to the American consumer.

## Acknowledgment

I gratefully acknowledge that for the historical data on wet-processing I drew heavily on "Historical Notes On The Wet-Processing Industry," compiled by Sidney M. Edelstein and published by *American Dyestuff Reporter* in 1956.

# The Fibrogram: Its Concept And Use In Measuring Cotton Fiber Length

## THE ADVENT OF THE DIGITAL FIBROGRAPH HAS RENEWED INTEREST IN THE FIBROGRAM

**By C. B. LANDSTREET***

THE theory of the fibrogram was published in 1940 by Hertel[1]. The principle was used in the Fibrograph, an instrument for quickly determining fiber length.

Recently there has been renewed interest in measuring the distribution of fiber lengths especially since the advent of the digital type Fibrograph. The length array is being used on an increasing scale particularly for obtaining the per cent of very short fibers in a sample.

This paper describes simply the basic ideas involved in the fibrogram. A method for plotting the fibrogram from array data, and an interpretation of the curve is discussed.

### The Fibrogram Theory

The fibrogram is a plane curve showing the relationship between two variables—probability and length. The curve has certain geometrical properties that are useful for describing the length characteristics of fiber populations.

*Cotton Technologist, Assistant to the Engineer in Charge, U.S.D.A. Cotton Quality Investigations Laboratories, University of Tennessee, Knoxville, Tenn. Mr. Landstreet was one of the featured speakers at the Spring meeting of the Textile Quality Control Association, March 23-24 at Charlotte, N. C.

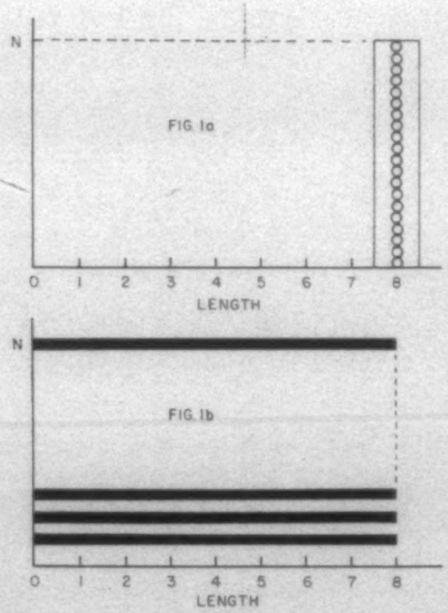
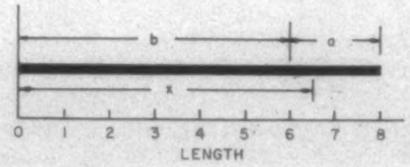



**Fig. 1—Two arrangements of a fiber sample from a population where all fibers have the same length. Fig. 1a is the histogram and 1b the cumulative number curve.**

The most simple fibrogram can be produced from a fiber population in which all the fibers have the same length. If a sample of N number of fibers were drawn from a population in which all the fibers were one inch long, a histogram such as the one shown in Fig. 1a could be plotted. This histogram could be thought of as being formed by stacking all the fibers on each other so that only their ends would be visible. Various shape histograms would be formed if different length groups were present in the sample. The histogram showing fiber length versus number of fibers was called the P-curve by Hertel.

The histogram can be re-arranged to give the plot shown in Fig. 1b. Here the fibers have been arranged with one end aligned on the vertical or N axis. This is a cumulative number curve and was called the Q-curve by Hertel.

The fibrogram or R-curve is not a re-arrangement of the Q-curve. Its construction is based on probability theory. A sample of one fiber perfectly represents the distribution for the special case where all the fibers in the population are the same length. Fig. 2a shows one of these fibers. The question is: If a fiber is caught at some point X along its length, and X is a random variable, what is the probability that the fiber




PROBABILITY TABLE

| b | $p(x \geq b)$ |
|---|---|
| 8 | 0.000 |
| 7 | 0.125 |
| 6 | 0.250 |
| 5 | 0.375 |
| 4 | 0.500 |
| 3 | 0.625 |
| 2 | 0.750 |
| 1 | 0.875 |
| 0 | 1.000 |

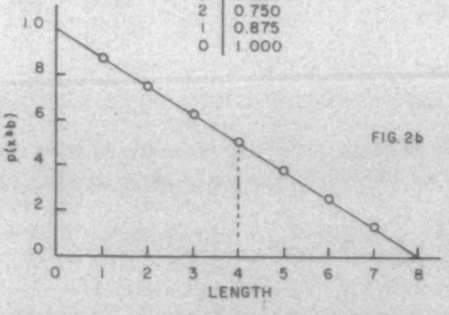



**Fig. 2—Development of the fibrogram for the special case where all fibers are the same length.**

will extend to the right a distance equal to b or longer? The probability of success of this event is the ratio between the ways to succeed and the sum of ways to succeed or fail. In the case of the fiber in Fig. 2a the event will succeed any time point X falls within the length a.

The probability for different catch points can be calculated as follows:

$$p\ (X \geqq b) = a/(a+b) \qquad \text{Eq. 1}$$

The probability $p\ (X \geqq b)$ will henceforth be referred to as the probability of extension. The probabilities for nine values of b have been calculated and are shown in the table in Fig. 2. These values have been plotted in Fig. 2b. This line, or curve is a fibrogram for a population in which the fibers have the same length. The curve shows that a fiber caught at random along its length will extend to the right one-half its length or longer 50% of the time. It will extend to the right 7/8 of its length or longer only 1.1% of the time. Other probabilities can be read from the curve.

The fibrogram is not normally used in this manner. Its primary function is to show the length characteristics of the distribution. If a line is drawn tangent to the curve shown in Fig. 2b at L equal zero it will intersect the length axis at a point equal to the mean fiber length. A tangent to the curve in Fig. 2b coincides with the curve over its full length and intersects the length axis at eight units, which is the mean length, and in this example the only length.

The same reasoning used here for one fiber length can be applied to populations in which there are different fiber lengths. Fig. 3a shows two fibers, one of which is half the length of the other. They could represent a population of any number of fibers provided there are the same number of both lengths in the population. The long fiber has been divided into eight unit lengths or event spaces. The short fiber will therefore contain only four spaces. The total ways that an event can succeed or fail is 12. The probabilities have been worked out as before and the data is shown in the table in

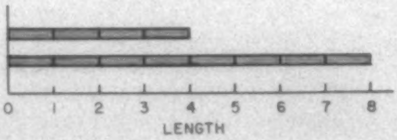



FIG. 3a

PROBABILITY TABLE

| b | p(x≥b) |
|---|---|
| 8 | 0.000 |
| 7 | 0.083 |
| 6 | 0.167 |
| 5 | 0.205 |
| 4 | 0.333 |
| 3 | 0.500 |
| 2 | 0.667 |
| 1 | 0.833 |
| 0 | 1.000 |

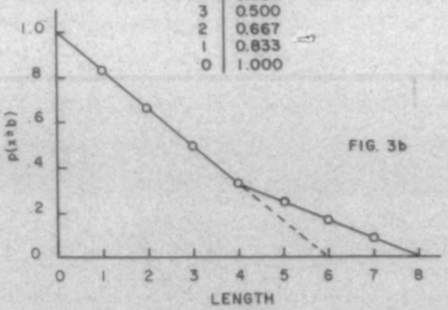



FIG. 3b

**Fig. 3—Development of the fibrogram for the special case where there are fibers of two different lengths.**

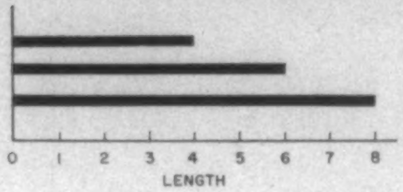



FIG. 4a

PROBABILITY TABLE

| b | p(x≥b) |
|---|---|
| 8 | 0.000 |
| 7 | 0.056 |
| 6 | 0.111 |
| 5 | 0.222 |
| 4 | 0.333 |
| 3 | 0.500 |
| 2 | 0.667 |
| 1 | 0.833 |
| 0 | 1.000 |

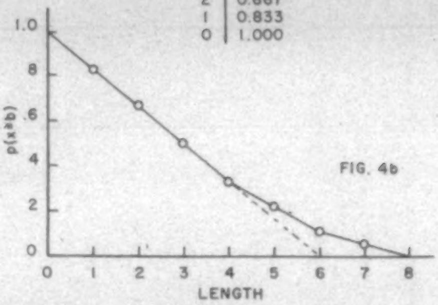



FIG. 4b

**Fig. 4—Development of the fibrogram for the special case where there are fibers of three different lengths.**

Fig. 3. The fibrogram is shown in Fig. 3b. It can be seen that the curve is not one straight line as before but is made up of two straight lines. A tangent drawn as described before will intersect the length axis at the mean fiber length. The tangent is shown in Fig. 3b as the dotted line. It intersects the length axis at six units which is exactly equal to the calculated mean length of the two fibers.

Fig. 4a shows three fibers of different lengths. The total ways an event can succeed or fail is 18. The probabilities are shown in the table in Fig. 4 and the fibrogram is shown in Fig. 4b. The tangent is drawn as before and again the intersection gives the mean fiber length of the three fibers.

## Construction Of Fibrograms For Real Samples

The same procedures as described here were used for constructing fibrograms for samples that were arrayed with a Suter-Webb sorter.

The first step after the array was made was to convert the weight of each length group from the sorter to number of fibers per group. This can be done in one of two ways. If the weight fineness for each length group is determined it can be used as follows:

$$N_g = W_g/(L_g \times P) \qquad \text{Eq. 2}$$

where $N_g$ is the number of fibers in length group $L_g$ and p is the weight fineness for the particular group. If the weight fineness is not known it could be assumed constant for all length groups. The number of fibers in a group would then be proportional to the ratio of the weight of the group to the length of the group.

$$N_g \propto W_g/L_g \qquad \text{Eq. 3}$$

The next step was to plot a histogram as shown in Fig. 5a and sketch in a smooth curve. Values for N for $\frac{1}{16}$-inch incre-

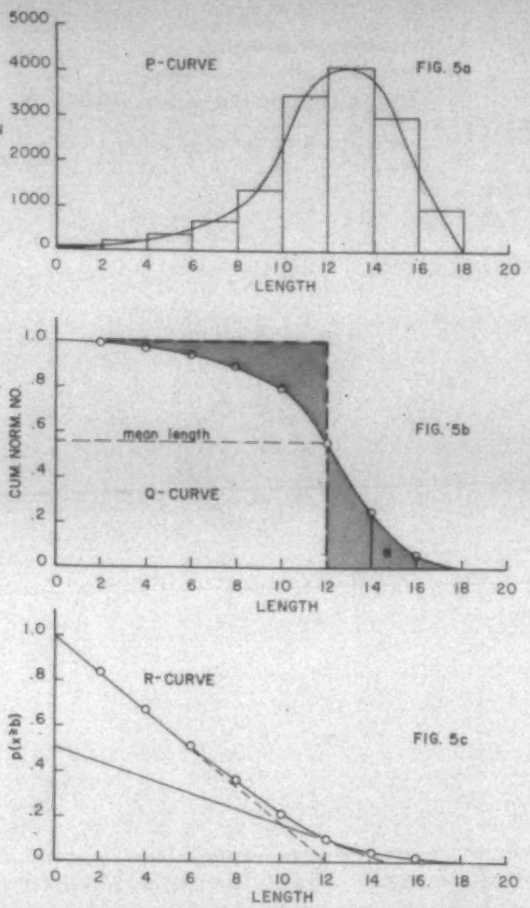



**Fig. 5—The P, Q and R curves for a short staple cotton.**

Table.—Data for Plotting the P, Q and R-curves for a Short Staple Cotton.

| L' | $L_g$ | $N_g$ | $N_g/N_t$ | Cum. No.≥L' | a/A |
|---|---|---|---|---|---|
| 1 | 0.5 | 35 | .0012 | .9988 | .916 |
| 1 | 0.5 | 35 | .0012 | .9988 | 9.16 |
| 2 | 1.5 | 115 | .0041 | .9947 | .834 |
| 3 | 2.5 | 175 | .0062 | .9885 | .748 |
| 4 | 3.5 | 275 | .0097 | .9788 | .669 |
| 5 | 4.5 | 375 | .0132 | .9656 | .588 |
| 6 | 5.5 | 520 | .0184 | .9472 | .508 |
| 7 | 6.5 | 675 | .0238 | .9234 | .430 |
| 8 | 7.5 | 850 | .0300 | .8934 | .354 |
| 9 | 8.5 | 1150 | .0406 | .8528 | .275 |
| 10 | 9.5 | 1650 | .0583 | .7945 | .212 |
| 11 | 10.5 | 2750 | .0971 | .6974 | .149 |
| 12 | 11.5 | 3825 | .1351 | .5623 | .098 |
| 13 | 12.5 | 4100 | .1448 | .4175 | .055 |
| 14 | 13.5 | 4075 | .1439 | .2736 | .029 |
| 15 | 14.5 | 3650 | .1288 | .1448 | .015 |
| 16 | 15.5 | 2350 | .0830 | .0618 | .004 |
| 17 | 16.5 | 1350 | .0477 | .0141 | .001 |
| 18 | 17.5 | 400 | .0141 | .0000 | .000 |
| Tot. | | 28320 | 1.0000 | | |

L'—upper cell boundary
$L_g$—cell mid point
$N_g$—number of fibers in group
$N_g/N_t$—normalized fiber numbers

ments in length were read from the curve and tabulated as shown in Col. 3 of the table. The number of fibers in each group was normalized by dividing each $N_g$ by the total number of fibers. The normalized numbers are listed in Col. 4 of the table. These numbers were cumulated to give Col. 5. A plot of Col. 5 versus length is shown in Fig. 5b. This is Hertel's Q-curve, or cumulative number curve. The mean fiber length (shown in Fig. 5b) is such that the shaded areas are equal.

The fibrogram or R-curve is shown in Fig. 5c. The values for $p\ (X \geq b)$ were obtained in a different way than previously described for the special cases of one, two and three fibers. Fig. 5b can be thought of as being formed by stacking all the fibers in descending order of length with their left ends aligned on the vertical axis. Their right ends would then describe the curve shown in Fig. 5b. A solid line intersecting the curve was drawn at a length of 14 in Fig. 5b. The area to the right of this line was designated a. If the total area under the curve is A the probability that a fiber drawn at random from this population will be as long as 14 or longer a/A. That is:

$$p\ (X \geq b) = a/A \qquad \text{Eq. 4}$$

The probabilities were calculated for a number of points and are shown in the last column in the table.

The mean fiber length was obtained by constructing a tangent to the fibrogram at L equal zero and reading the point of intersection of this tangent and the length axis. This length is 12 units, the same as obtained from the Q-curve.

The Upper-Half Mean length was obtained from the R-curve. This is the length usually referred to when length is measured by a Fibrograph. The U.H.M. length is defined as: the mean length by number of the longest one-half of the fibers by weight. The tangent that gives this length was drawn tangent to the fibrogram and through point 0.50 on the vertical axis. This tangent is shown in Fig. 5c.

## Summary And Conclusions

The fibrogram is a curve based on the probability of drawing a fiber from a given population in a particular way. The curve has certain geometrical properties that make it useful in obtaining measurements of fiber length. Fibrograms were developed for three special cases for which fiber populations were represented by one fiber, two fibers of different lengths and three fibers of different lengths.

One example describing how a fibrogram could be developed from array data was described in detail.

Producing fibrograms from array data is a rather time consuming job. Usually it is desirable to plot both the histogram and cumulative number curves before plotting the fibrogram. The technique described here has been used by workers at the Fiber Quality Investigations Laboratory at Knoxville in basic studies of fiber length distributions and instrument calibration. A knowledge of the concepts described should help all those involved with fiber length measurements make better use of data obtained by such laborious means as fiber sorting. For those who would use the Fibrograph to maximum benefit, an understanding is essential.

## Appendix

There are two problems of probability involved in the fibrogram. The first concerns the frequency of selection of certain length fibers from the population. The second has already been

discussed and concerns the location of the catch point along fibers of various lengths.

For an example, suppose that a fiber population is represented by two fibers, one of which is twice as long as the other, and that there are equal number of fibers of both lengths present. The population could be represented by a graph such as Fig. 3a.

The question is: If a fiber is drawn at random from this population, what is the probability it will extend to the right a given distance or farther? Let the given distance be, for this example, one-half the length of the short fiber or two unit-lengths. The probability of drawing the short fiber will be:

$$p\ (\text{drawing short fiber}) = 4\ \text{units}\ (4\ \text{units} + 8\ \text{units}) = 1/3 \qquad \text{Eq. 5}$$

and the probability of drawing the longer fiber will be:

$$p\ (\text{drawing long fiber}) = 1 - 1/3 = 2/3 \qquad \text{Eq. 6}$$

These ratios will not change though the event spaces be increased to an infinite number. The probability of drawing the short fiber is one-half that of drawing the long one.

The question of how far a fiber will extend to the right once it has been drawn must now be answered for each fiber, as they are of different lengths. The probability that the short fiber will extend to the right equal to or greater than two units is:

$$P\ (X \geq b)_s = 2\ \text{units}/4\ \text{units} = \tfrac{1}{2} \qquad \text{Eq. 7}$$

The probability that the long fiber will extend to the right equal to or greater than two units is:

$$P\ (X \geq b)_1 = 6\ \text{units}/8\ \text{units} = \tfrac{3}{4} \qquad \text{Eq. 8}$$

The probability of drawing the short fiber and having it extend to the right equal to or greater than two units is the product of the probabilities of drawing and of extension.

$$p\ (\text{draw \& ext.})_s = p\ (\text{draw short fiber}) \times p\ (X \geq b)_s \qquad \text{Eq. 9}$$

$$p\ (\text{draw \& ext.})_s = \tfrac{1}{2} \times 1/3 = 1/6 \qquad \text{Eq. 10}$$

The probability of drawing the long fiber and having it extend to the right equal to or greater than two units is:

$$p\ (\text{draw \& ext.})_1 = p\ (\text{draw long fiber}) \times p\ (X \geq b)_1 \qquad \text{Eq. 11}$$

$$p\ (\text{draw \& ext.})_1 = \tfrac{3}{4} \times 2/3 = \tfrac{1}{2} \qquad \text{Eq. 12}$$

Finally, combining Equations 10 and 12 gives the probability that a fiber drawn at random from the given population will extend to the right two units or more.

$$p\ (X \geq b)_s = p\ (\text{draw \& ext.})_s + p\ (\text{draw \& ext.})_1 \qquad \text{Eq. 13}$$

$$p\ (X \geq b)_s = 1/6 + \tfrac{1}{2} = 2/3 \qquad \text{Eq. 14}$$

The calculated probability for the example is, therefore, 2/3 or the occurrence of about 67 times in a hundred.

**The same reasoning as described above can be applied to fiber populations in which there are many different length groups. If the numerical values for $p\ (X \geq b)_s$ are calcu**lated for real fiber samples and plotted, the resulting curve will be a fibrogram for that particular sample.

The fibrogram can be developed for practical use by a different method than described here. A ribbon composed of parallel fibers distributed at random along its length is clamped as shown in Fig. 6a. All the fibers to the right of the clamp line not held by the clamp are removed by combing or some suitable method. The ribbon is then cut at equal length increments as shown in Fig. 6b and the weight of fibers in each increment plotted as shown in Fig. 6c. The

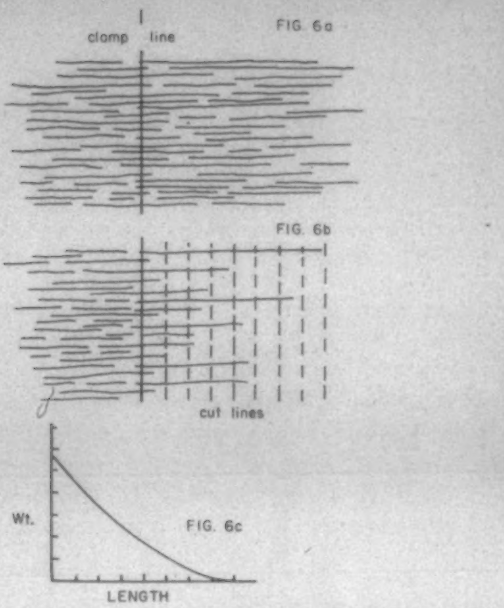



**Fig. 6—A sketch showing the clamping method for producing a fibrogram.**

resulting curve will be a fibrogram. In practice the fibers are caught at random by using combing techniques and the sample is optically scanned rather than cut and weighed.

Two important length measurements obtained quickly from the fibrogram are mean fiber length and Upper-Half Mean length. A Q-curve or cumulative number curve is shown in Fig. 7a, and the fibrogram in Fig. 7b. The height of any vertical line in Fig. 7b represents the area a to the right of the line in Fig. 7a drawn to the same point on the L axis. The intersection of the fibrogram (Fig. 7b) and the vertical axis represents the total area under the Q-curve. This point is shown as NL. A line drawn tangent to the fibrogram will intersect the length axis at a point λ as shown in Fig. 7b. The

*(Continued on Page 74)*

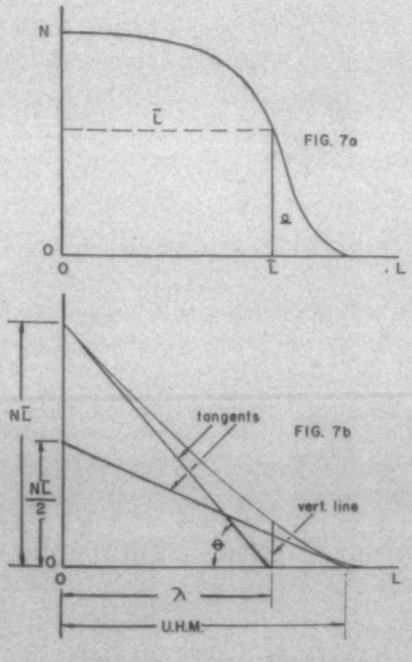
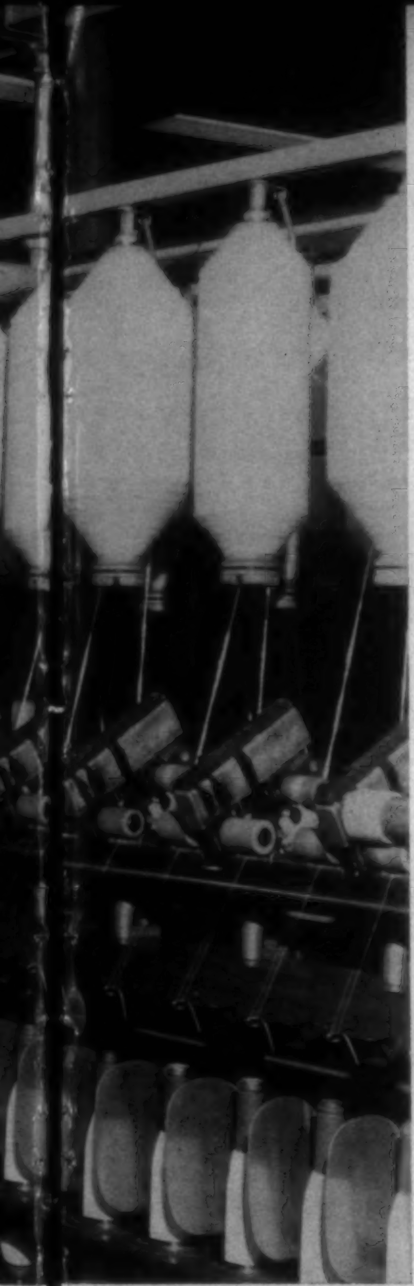



**Fig. 7—The geometry of the fibrogram.**

Gilbert Mays, Overseer of Spinning at Erwin Mills Plant #1, and Jerry Ellis, Overseer of Spinning at Plant #4, check yarn production with Armstrong man J. S. Gebbie. Accotex products on this double-apron spinning frame: NO-728 and NC 762 Cots; NO-7075 Aprons; NK-770 Covers on revolving clearers.

T. C. Pegram, Supt. Plant #1, R. B. Cooke, Supt. Plant #4, Armstrong man J. S. Gebbie, and A. M. Moore, Supt. Plant #6, discuss characteristics of new Accotex spinning cot.

Luther Rasberry, Overseer of Carding at Plant #1, replaces comber detaching roll covered with Accotex NO-728. Accotex J-490 coverings are used on comber draw box rolls.



*From comber to spinning frame, Accotex Cots and Aprons will help you turn out quality yarn*

Although your card room and spinning room frames do different jobs, the quality of their work largely depends on the performance of their drafting roll covers and aprons . . . and this in turn requires the careful selection of the right material for each job.

This selection problem is simplified by the wide range of materials in the Accotex line. In it you'll find special compounds that are engineered to meet the requirements of each frame in the yarn preparation and spinning process.

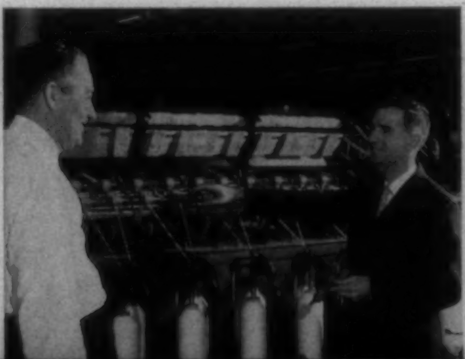
When you specify Accotex products, you also get the benefit of the training and experience of your Armstrong representative . . . a man who's just as interested in how Accotex materials work as he is in selling them. A good example is Armstrong man Jack Gebbie, shown here working with personnel of three of the Erwin Mills plants at Durham, North Carolina.

Your Armstrong man will help you get maximum production of quality yarn. Call him in on any roll covering or apron problem. Or write Armstrong Cork Company, 6504 Davis Avenue, Lancaster, Pa.

Armstrong

ACCOTEX COTS AND APRONS

Drawing frame operation is observed by Ottis F. Jackson, Overseer of Carding at Plant #6, and Armstrong representative J. S. Gebbie. Drawing rolls are covered with Accotex J-490.



Roving frame production is checked by J. G. Saunders, Overseer of Carding at Plant #4, and Jack Gebbie. Frame equipped with Accotex J-490 and NC-762 Cots, NO-7876 Aprons.

Roll shop foreman Otto Mayes checks buffing of Accotex NO-728 Cots with Jack Gebbie. Modern roll shop is equipped with buffing and assembly machines manufactured by Armstrong.

# How Soon Can You Buy Your Automatic Doffer?

## DRAPER ACQUIRES U.S. RIGHTS TO SPANISH DOFFER; DEERING MILLIKEN UNIT MAY BE READY THIS YEAR

IF you're following the progress being made in getting automatic doffing systems for spinning frames on the market, two recent announcements offer promise of a speed-up in their development in the months ahead.

(1) Draper Corp. has acquired all rights to the Willcox & Gibbs Treufus doffing machine; and

(2) Deering Milliken Research Corp. expects soon to license manufacturing rights on its Milliken doffer.

### First Patents Issued

First U. S. patents on both these units were issued in late 1960. The Treufus unit, developed in Spain, was shown publicly for the first time in this country at the Southern Textile Exposition in Greenville, S. C., last Fall. The Milliken doffer has been undergoing extensive mill trials at Drayton Mills in Spartanburg for some months on a three-shift basis.

There's little similarity between the two, although both attempt to accomplish the same end, more or less. The Treufus unit, for example, is mechanically actuated and manually operated. No electrical connections are required. The Milliken doffer, on the other hand, is described not entirely facetiously by Roger Milliken as a system that will do for the textile industry what the automatic pin setter has done for bowling. As we shall see further on, there's more reason than rhyme in what he hopes.

### How Does The Treufus Work?

The first U. S. patent on the Treufus doffer was issued last November 29 to Roberto Escursell Prat, assignor of one-half to Juan Hostench Serra, both of Barcelona, Spain. Several of the drawings from this patent are being reproduced here to illustrate the principles of its operation. If ballooning separators are provided on the spinning frame, they must be moved to an inoperative position before the doffing unit can be operated.

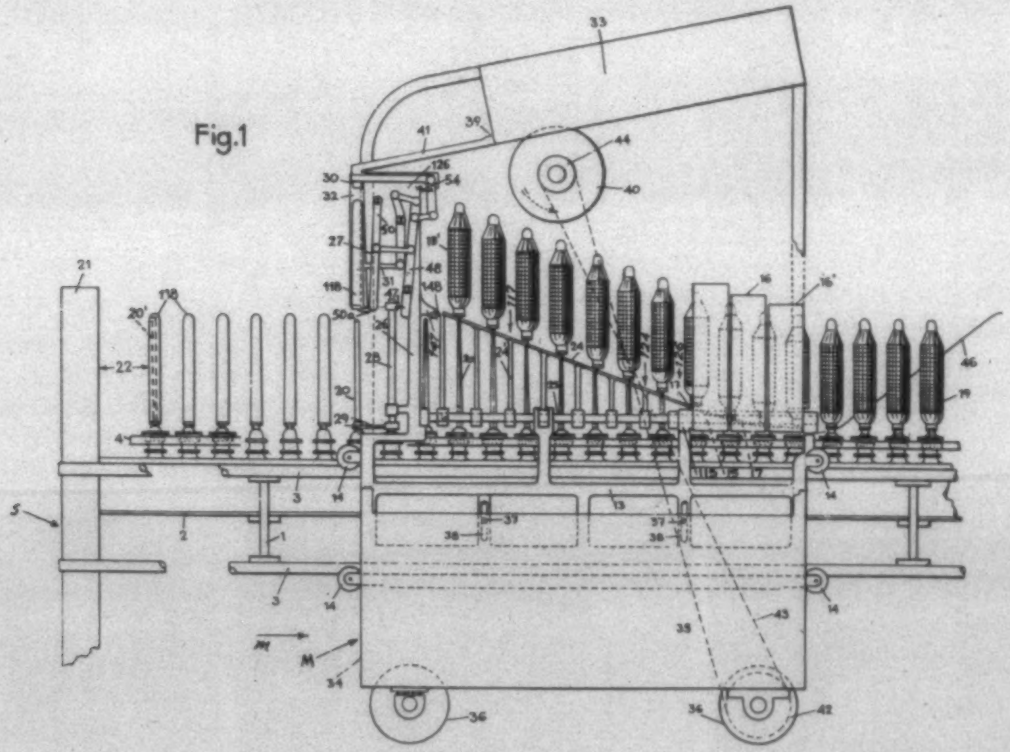
In Fig. 1 the device is shown attached to the spinning frame rails (3) by rollers (14) which guide a supporting frame (13) along the frame. A trolley (34) is supported on floor engaging wheels (36) and is connected to the supporting frame.

As the device is pushed along the spinning frame (from left to right in Fig. 1), the filled bobbins (18) are lifted and removed from the spindles (20) and empty bobbins (118) are placed on the spindles. When the bobbins are lifted completely off the spindles by the inclined doffing track (24), they drop into a receptacle (35) in the trolley (34).

The bobbins are initially lifted by doffing members (16) which are shown in Figs. 5 and 6.

As the bobbins move into the doffing members (16), the lower edge of the bobbins engage a pair of cam tracks (17) carried by the lower portion of the doffing members. The cam

Fig.1



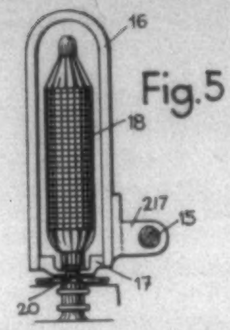


Fig. 5

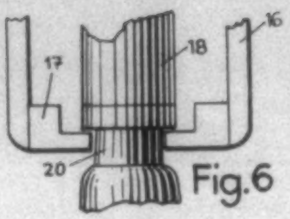


Fig. 6

tracks of succeeding doffing members are inclined to raise tightly seated bobbins from the spindles and carry them to the doffing truck. Empty bobbins are stored in a receptacle and are fed to the device by a rotating drum (40) which projects into the receptacle, as shown in Fig. 1. A belt (43) drivingly connects the drum to one of the wheels (36) so that the drum rotates as long as the trolley is pushed.

Fig. 10 is a view of the left hand end of the device and shows the manner in which the empty bobbins are fed in a vertical position into an inclined chute (32). The bobbins are fed down the chute and the endmost bobbin is supported above the next empty spindle.

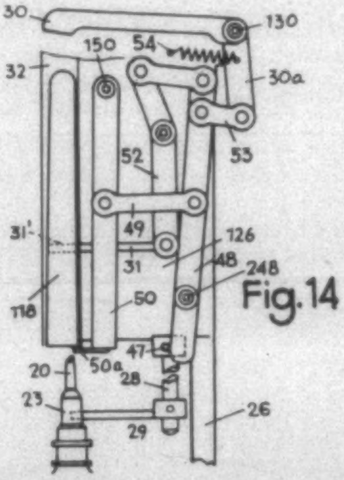


Fig. 14

Fig. 14 is a fragmentary view of the mechanism for placing the empty bobbins on the spindles. The bobbin is supported in the chute (32) and above the spindle (20) by a projection (50a) on the lower end of a lever (50). A feeler (29) engages the spindle and rotates a shaft (28) to operate a lever (48) which releases the bobbin to fall onto the spindle. At the same time, a spring (54) turns a lever (30a) so that the lever arm (30) exerts a hammer blow onto the top of the empty bobbin to accelerate its descent and assure a tight seat of the bobbin on the spindle.

This initial patent (Patent No. 2,961,822) contains 25 claims which are directed to the apparatus and method of donning and doffing the bobbins.

## Cuts Doffing Costs By Over 70%

Draper hasn't made any claims yet on what the Treufus will do, but Willcox & Gibbs, which is retaining all rights to the unit in European and South American markets, has said the following.

Doffing rate—15,000 to 18,000 bobbins per hour actual

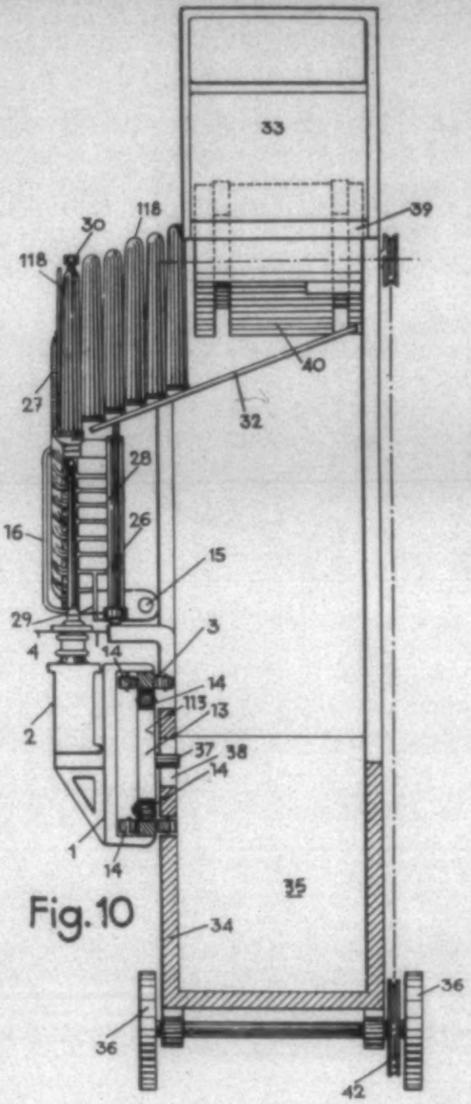


Fig. 10

machine rate of doffing and replacement; working rate, allowing for handling full and empty bobbins and other auxiliary operations, 6,000 to 8,000 bobbins an hour, depending on package size.

Running speed of machine—80 feet per minute.

Percentage of yarn breakage—virtually zero, piecing up rarely needed.

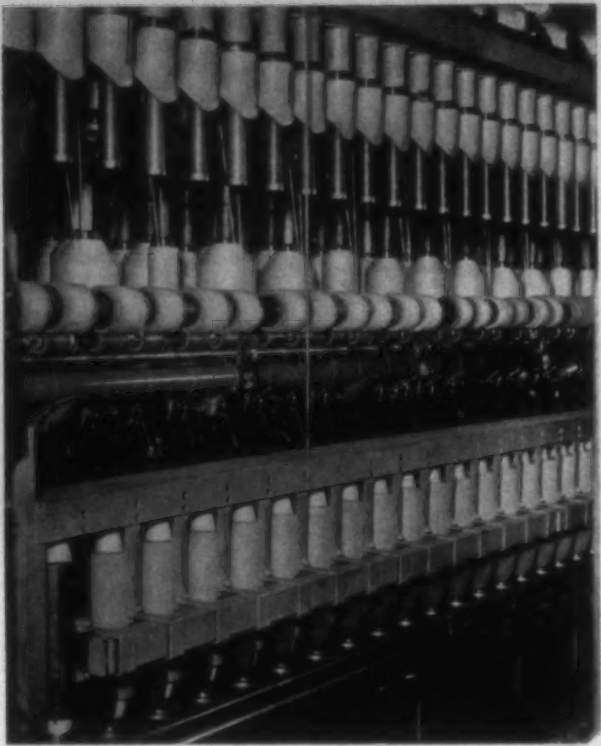
Machine fits all gauges.

Machine is mobile, quickly moved from frame to frame. (The unit is 18 inches wide, 56 inches long, and adjustable to the height of the spindle rail.)

Draper plans to concentrate research and engineering on the Treufus at its plant in Hopedale, Mass. When tooling up is completed, the machines will be produced at Draper's subsidiary plant in Norristown, Pa.

## The Milliken Doffer

The Milliken doffer is as complex as the Treufus is simple. Its developers, who have been working on it for six years, view it as an "automatic doffing system" rather than merely a mechanical substitute for manual doffing. In addition to doffing, it also supplies the doffer itself with empty bobbins and mechanically takes the full bobbins from the doffer and conveys



**DOFFING BEGINS—Graspers are in position over full bobbins. Empty bobbins visible at top of picture will be lowered onto the spindles after the full bobbins are lifted.**

**DOFFING CLOSE-UP—Empty bobbins are being placed on the spindles. Full bobbins have just been doffed and will be carried direct to the loading station.**

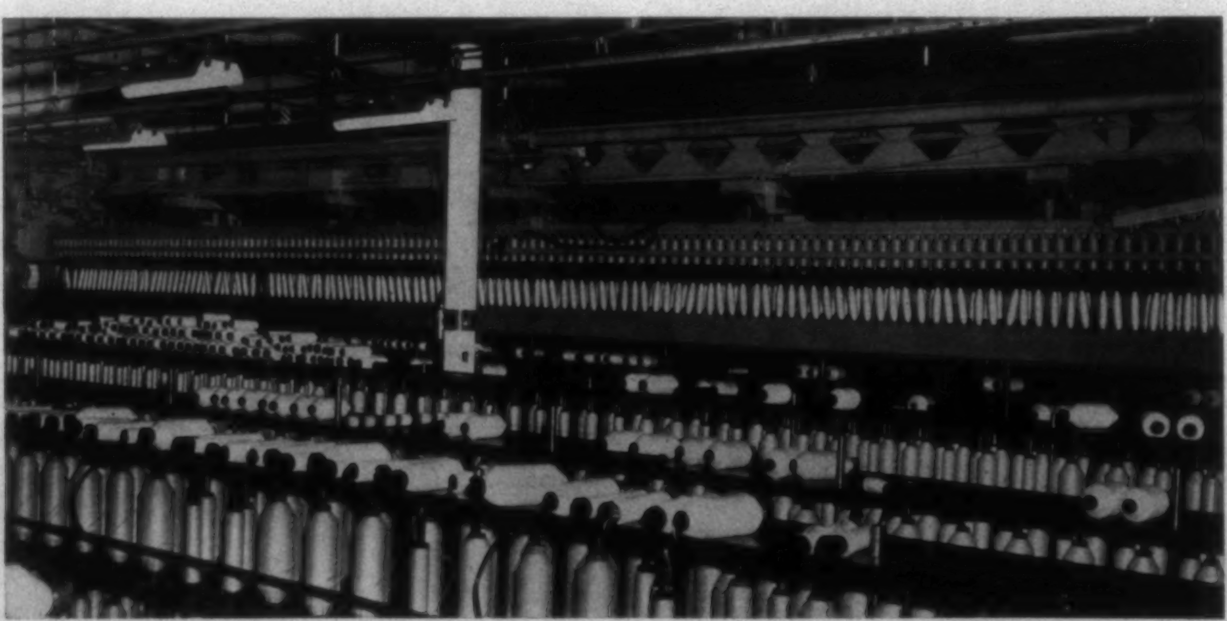
them by automatic means to the next process.

As indicated earlier, the operation of the Milliken doffer is similar to the automatic bowling pin setter. It moves over the spinning frames on ceiling suspended rails. In operation it automatically seeks out frames approaching the doff cycle five to ten minutes before time for doffing. From this position it is lowered by an operator into guide brackets mounted on each end of the frame. Both sides are doffed simultaneously, and empty bobbins placed on the spindles simultaneously.

As shown in accompanying photographs, the doffer consists of a bank of hollow metal sleeves, each of which houses a pneumatically activated expandible-contractible lifting arrangement that descends onto the full bobbin and unseats it from the spindle in a smooth, even lifting motion.

The initial patent on the doffer, issued last December 6 (U. S. Patent 2,962,856), lists a number of alternative methods for controlling the lifting action of the full bobbin from the spindle. One such arrangement is shown in Fig. 11.

Referring to that drawing, a rigid hollow support beam (11) is supported by cables (13). Mounted on the lower



**LOADING STATION—A vital part of the automation provided by the Deering Milliken doffing system is the loading station, shown in the center of this photograph. The automatic doffer is immediately above the loading station.**

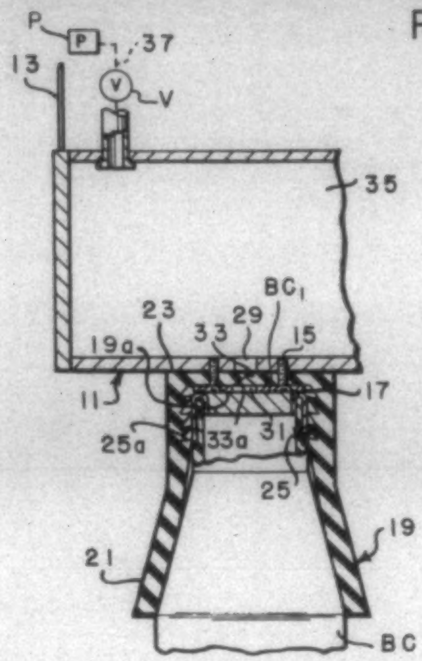



Fig. 11

side of the support beam are inverted cup shaped end-holders (19). The open lower end (21) of each holder has a flared skirt configuraton which guides the ends of the bobbins into the upper gripping or holding section of the bobbin end holder. The end holders are of elastic material—such as rubber, neoprene, plastic, etc.—to give them an inner gripping surface (25) to hold the end of the bobbin (BC).

In this particular arrangement, the gripping surface is formed by a number of flexible annular rings (25a) of sawtooth cross-sectional configuration which provide a smaller resistance to bobbin insertion into the holder than to removal of the bobbin from the holder. This, of course, reduces significantly the force required to seat the bobbins within the holders.

Positive acting pneumatic ejection of closed-end bobbins (BC) is provided through a pneumatic force effecting arrangement between a source of pneumatic pressure (P) and the upper end of the holder which takes the form of apertures (29, 31) in the lower wall of the hollow support beam (11) and the washer (17), and a correspondingly aligned transverse slit (33) formed in the base (23) of the cup shaped holder (19).

The transverse slit has an inverted Y-shaped cross-sectional configuration having lips (33a) which are normally in mutual resilient contact, this configuration being provided so that entry of a bobbin into the holder gripping section (25) will be relatively easily accomplished, the air trapped inside the upper end of the holder escaping easily through valve formed by the slit (33). Removal by pulling on the bobbin is opposed not only by the sawtooth gripper rings but also by virtue of the greater resistance to air flow into the partially evacuated chamber which is formed at the upper end of the holder above the bobbin upon any attempt to forcibly or accidentally dislodge the bobbin from the holder.

The bobbin may be positively ejected or seated by opening a control valve (V) in the pressure supply line, thereby applying air pressure to the upper closed end ($BC_1$) of the bobbin through the common air conduit including supply line (37) and the hollow airtight support beam, and thence through slit valve (33). It is apparent that while the slit provides a resistance to air flow into the upper end of the holder (19) considerably greater than the resistance to outflow therethrough from the holder, it will nevertheless permit air under pressure—such as, for instance, 15-20 p.s.i.—to pass through from the hollow interior (35) of the support beam into the upper end of the holder to thereby forcibly eject the bobbin from the holder.

This particular arrangement is only one of several covered in the initial patent, but all are basically the same.

### Test Installation

In the trial installation at Drayton Mills in Spartanburg, one Milliken doffer is being used to doff 24 spinning frames. The warp frames are 288 spindles, 3½-inch gauge. Average yarn count is 40s cotton with a doff cycle of about 10.5 hours. Approximately 100,000 bobbins a week are being doffed on a three-shift basis.

Based on records of doffing over 3 million bobbins, Drayton reports an average of 11 ends-down per frame doff; average frame down-time of two minutes per doff.

The doffer moves in a controlled cycle until it is signaled to a frame for doffing. Its speeds are 135 ft./min. lengthwise and 25 ft./min. crosswise in the bay. Depending on room conditions the headroom required for an installation will range from 27 to 44 inches. Maximum track ceiling hanger load is about 3,400 pounds on 10½-foot centers. The unit will doff frames situated as close at 12 inches to columns.

### Auxiliary Components

Integral components of the Milliken system are a loading station and bobbin sorting equipment. The latter can sort, arrange and distribute more than 100,000 bobbins a day to the load/unload station. At the completion of each doff the doffer moves immediately to the loading station, deposits the full bobbins, picks up a supply of empty bobbins and resumes its patrol of the bay.

From the loading station full bobbins can be moved mechanically to the next process. Since the doffer conveys the full bobbins from the spinning frame in the order of their placement on the spindles, it is possible to monitor the quality of yarn from individual spinning spindles by placing recording controllers at the winder spindles. This added feature is still another factor in the concept that the Milliken doffer is a "system" not a mechanical substitute for a single operation.

Also part of this concept is a bonus feature of the bobbin sorting equipment. In sorting, arranging and distributing the empty bobbins, this equipment also acts as a bobbin inspection device. Bobbins with burrs, nicks, cuts, etc., are automatically rejected by the sorting equipment.

### When Will It Be Available?

For some months now the Deering Milliken Research Corp. has been developing plans for a 10,000-spindle cotton mill designed to incorporate as many proven methods of machine handling of materials as practicable. The Milliken doffing system is a major component of this concept. And if it can be shown successfully used in a 10,000-spindle installation, its potential will then be obvious in any size installations.

D.M.R.C.'s tentative timetable for the pilot plant foresees initial operations beginning in the Fall of 1962. In the meantime licenses for the manufacturing and marketing of the doffer are to be granted in this country and abroad. It's hoped that production will be possible by the end of this year.

# The Loomfixer And His Job **Part 28**

## BY USING ALL AVAILABLE GAGES, THE LOOMFIXER CAN MAKE HIS WORK EASIER AND MORE EFFECTIVE

**By WILMER WESTBROOK**

IN addition to the regular gages made and recommended by the loom manufacturers there are also a number of other gages useful to the loomfixer. In almost every weave room you'll find adaptations or improvision of gages that are used to set many loom parts.

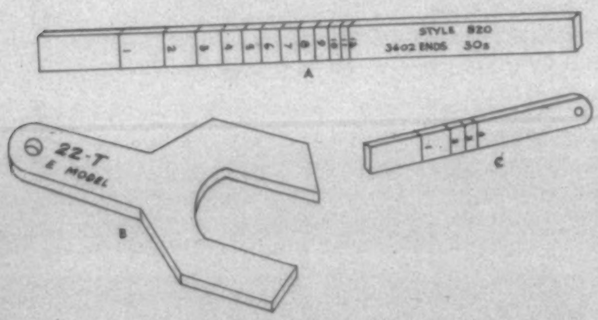
The front box plate gage, for instance, can be modified to gage many parts including the filling fork, the filling motion hook, the filling grate, the dagger, the dagger finger and parts of the filling changing mechanism in addition to its original purpose.

A gage used with good results in some mills resembles a carpenter's square with one arm sawed off to a short stub. This gage is used to position the lug on the picker stick, to set the power arm, to check the length of stroke of the picker stick, to time the harnesses, and to adjust the height of the whip roll and the warp stop motion.

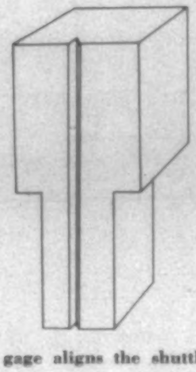
A similar gage made of a wood block with notches cut in it is also used for some looms. The overall length of the gage measures the distance from the warp beam bearing to the whip roll bearing. One notch measures the distance from the back of the stop motion girt to the stop motion end. Another notch is used to time the harnesses. The width of the gage sets the height of the whip roll shaft bearings and the narrow width is used to gage the height of the stop motion girts.

It is also possible to make a gage for measuring the distance from the floor to the top of the whip roll. This consists of a base made of a gear blank supporting a rod. Attached to the rod with a thumbscrew, so that it can be easily raised or lowered, is an arm that extends over the whip roll when the gage is set on the floor at the back of the loom.

A four-inch piece of round steel that is slightly smaller than the hole in the small end of the filling bobbin makes an effective gage for aligning the shuttle spring. The gage is inserted in the bobbin, the bobbin is placed in the shuttle, which is then tilted until the gage slides into the shuttle eye. If the spring does not hold the bobbin perfectly straight, them, of course, the gage will not enter the shuttle eye.



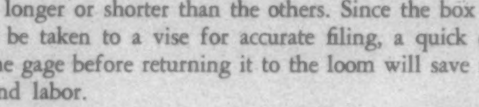

**Although these gages (a) warp stick, (b) pick change gear gage and (c) cloth stick, are not true loom gages, they are used by loomfixers in their work.**



**This shuttle centering gage aligns the shuttle in the exact center of the lay end.**

A gage for measuring the distance from the floor to the top of the whip roll can be made by using a gear blank for a base supporting rod. Attached to the rod with a thumbscrew, so that it can be easily raised or lowered, is an arm that extends over the whip roll when the gage is set on the floor at the back of the loom.

A gage for locating the fixed clutch disc on the crank shaft can be made of a short piece of pipe that will fit over the end of the shaft. A hole drilled through the pipe shows the correct distance from the end of the shaft to the clutch plate hub. Other holes can be drilled in the pipe to show the correct position for the clutch plates of other models or widths of looms.



**Some gages are modified to serve different purposes such as this filling fork and protector motion gage fashioned from a conventional front box plate gage.**

A perfectly flat, smooth steel plate about four inches square makes a gage to check the filling lugs of the back box plate. It is impossible to correctly align the box plate if one of the lugs is longer or shorter than the others. Since the box plate should be taken to a vise for accurate filing, a quick check with the gage before returning it to the loom will save much time and labor.

The six-foot steel rule is a very useful gage. It can be used to position the picker stick lug, the power arm, the whip roll, the warp stop motion, to measure the stroke of the picker stick, to time the harnesses, and for many other similar settings.

The loomfixer can make a handy protector motion gage for E-model looms from the square head of the bolt that holds the temple bracket onto the slide. The head is sawed off the bolt and is used to set the dagger finger to the binder and the dagger to the frog steel.

A gage can be made from wood to fit over the pick change gear of looms equipped with the high-roll take-up. The gear

can be checked for the correct number of teeth without removing it from the loom or even stopping the loom.

However, any shop-made or improvised gage should be carefully checked to see that it is accurate for the particular loom on which it is to be used. It is better to use no gage at all than to use the wrong one.

Any part of a loom that has an adjustable setting can be set with a gage. Because of wear or some unusual condition it may be necessary to deviate slightly from the gage settings at times. But the gage will establish a starting point and the loomfixer will know when, where, how and why to make allowances for any variation.

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# Centering A Warp-Stripe Design

## THE CENTERING OF WARP STRIPES IS DONE BY A PROCESS OF ELIMINATION—HERE'S HOW

**By E. B. BERRY**

A TEXTILE designer is given a color layout as shown in Fig. 1. This is to be woven in a striped fine Chambray fabric 38" wide 124 ends × 80 picks 40/1 cotton warp yarn × 50/1 cotton filling yarn. The fabric is plain weave with a ¼" white selvage on each side.

A simple way to work the color layout into this Chambray

**Fig. 2**

| 1 Color of Stripe | 2 Width of Stripe | 3 Dents Per Inch In Cloth | 4 Calculated Dents Per Stripe | 5 Used Dents Per Stripe | 6 Ends Per Dent | 7 Ends Per Stripe |
|---|---|---|---|---|---|---|
| White | .07" | 31 | 2.17 | 2 | 4 | 8 |
| Blue | .10" | 31 | 3.10 | 3 | 4 | 12 |
| White | .07" | 31 | 2.17 | 2 | 4 | 8 |
| Grey | .80" | 31 | 24.80 | 25 | 4 | 100 |
| White | .19" | 31 | 5.89 | 6 | 4 | 24 |
| Red | .78" | 31 | 24.18 | 24 | 4 | 96 |
| White | .19" | 31 | 5.89 | 6 | 4 | 24 |
| Grey | .80" | 31 | 24.80 | 25 | 4 | 100 |
| | 3.00" | | 93.00 | 93 | | 372 |

is shown in Fig. 2. Col. 1 is the color and Col. 2 the width. These are taken directly from the color layout.

The third column is dents per inch in the cloth. This will naturally vary with the construction of the fabric. The Chambray here is plain weave, with 124 ends per inch of 40/1 cotton warp yarn. Reeding 2 ends per dent, the calculation will be $\frac{124}{2} = 62$ dents per inch in the cloth. This is a very fine reed, and too fine with the 40/1 warp yarn. An alternate calculation is $\frac{124}{3} = 41.33$ dents per inch in the cloth. This too is a fine feed, and 3 ends per dent is not the ideal reeding for a plain weave. A third choice is $\frac{124}{4} = 31$ dents per inch in the cloth. This is a more practical reed number, and groups of 2 repeats of the plain weave in a dent. Therefore, the figure of 31 is used in Col. 3. A practical range of reed numbers is 20 to 40 for staple cotton fabrics.

Col. 4 (calculated dents per stripe) is simply the product of Col. 2 × Col. 3. This is a decimal, and is the number of dents needed, with a reeding of 4 per dent, to produce the desired width of stripe from the original pattern. Adjustments must be made since it is impossible to put in the cloth .17 dents. In this case, with a reeding of 4 per dent, it is possible to use ¼ dent, or one end; or ½ dent or 2 ends. However, this would put two colors in a dent, which, while possible, will present problems in drawing-in, weaving and repairing smashes.

Care must be exercised in making the adjustment from Col. 4 to Col. 5. If each individual line is increased, the pattern in the cloth may be larger than the original pattern. If each line is decreased, the pattern in the cloth may be too small. In either case, it may not be acceptable to the customer. Some colors, therefore, may be increased, while others are decreased. If the same color appears twice in the pattern, and has the same width in each position, the adjustment should be made in the same direction, to keep the stripes uniform. The Grey stripes in Fig. 1 are .80". These should be kept the same (25 dents) in Col. 5. The Red is .78" or a little smaller than the Grey .80". The Red, therefore, should be reduced to 24 dents.

Col. 6 is the ends per dent. In the case 4, which has already been determined in arriving at the number 31 in Col. 3.

Ends per stripe, Col. 7, is merely the product of Col. 5 × Col. 6. This is the exact number of ends that will appear in the cloth.

In order to determine the accuracy of these figures, the width of the stripe in the cloth should be very close to the width of the stripe from the original layout. The sum of Col. 2 is 3.00". The sum of Col. 7 is 372 ends, and with a sley of 124, the figures show $\frac{372}{124} = 3.00''$ which is corect.

Another way would be to use Col. 3 and Col. 5. The sum of Col. 5 is 93 and with 31 dents per inch in the cloth, the figures show $\frac{93}{31} = 3.00''$ the same as before. It may not always be possible to have the cloth come out so close. Adjustments should be made if the fabric repeat is ±3% from the original. In cases of a very coarse reed (20 to 25 dents per inch) this may be rather difficult.

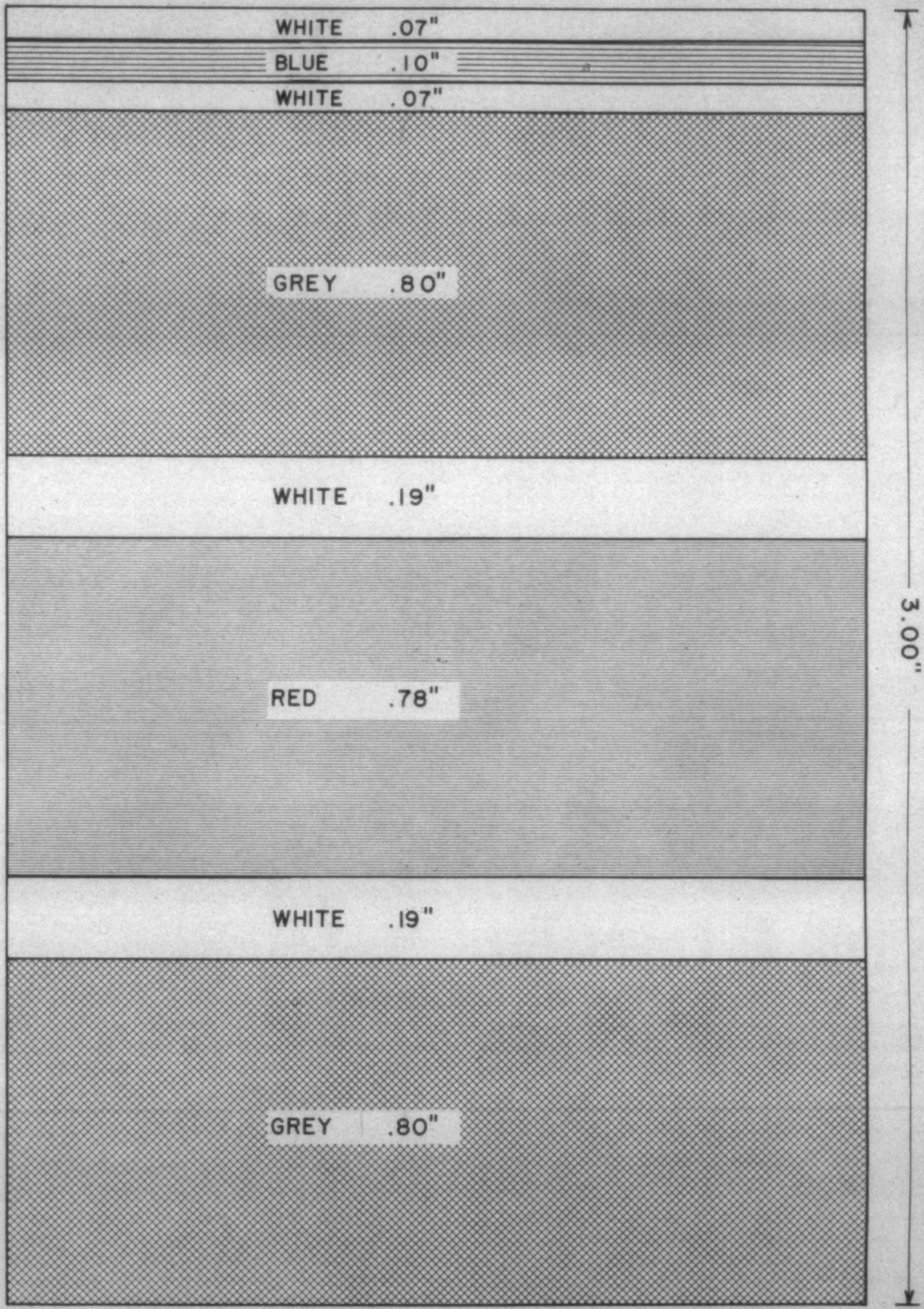
With the size of the repeat, and ends per repeat determined, the next step is to see how the repeat fits into the fabric. The customer wants ¼" selvage on each side. With the 31 dents per inch in the cloth, the figure is 31 × ¼" = 7.75 or 8 dents *each* side for selvage. In the 38" width, there are 38" × 31 dent/inch = 1178 dents total

1178 dents total
—16 dents selvage (both sides)
1162 dents body

There are 93 dents in one repeat, therefore, $\frac{1162}{93} = 12$ repeats + 46 dents extra. Then 46 × 4 ends per dent = 184 dent = 184 ends left over.

The color layout, together with the ends of each color is shown in Fig. 3.

Fig. 1




The designer must use this color layout as the basis for a design to be woven in a fine Chambray fabric.

**Fig. 3**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| WHITE | 8 | | 8 | | 24 | | 24 | |
| BLUE | | 12 | | | | | | |
| GREY | | | | 100 | | | | 100 |
| RED | | | | | | 96 | | |
| | | C | | 78 E | | | | S 78 |

If the repeat is started next to the left hand selvage with 8 ends of White there will be 12 full repeats with 184 ends extra. These 184 ends will terminate with 32 ends of Red next to the right hand selvage. With this layout, the pattern is obviously not "centered."

How is the best way to center the pattern? There is no hard and fast rule to determine this. Sometimes the customer will have some definite ideas as to what he wants. Occasionally the sales department will suggest what colors should be next to the selvages.

Lacking any specific instructions, the textile designer must use his own judgment in centering the pattern in the fabric. In most patterns, one group of stripes or one part of the design is more prominent than the remainder. For a better looking fabric at the selvage, it is best to have the least prominent part of the design next to the selvage. The bold effect, therefore, will remain intact, and away from the edges of the fabric.

In this Chambray fabric, the Red and Blue are the bold stripes, while the White and Grey are the subdued ones. This means the Red and Blue are to be kept away from the selvages.

One way to determine the proper layout is to select a center point in any one of the stripes. Since there are 184 extra ends over the 12 full repeats, 92 ends will be to the left of this center, and 92 ends to the right of this center. Most drawing-in is done from left to right, therefore, the 92nd end on the left is called the starting point, and the 92nd end on the right is called the ending point. The actual center point in any stripe used here is merely to establishing the starting and ending points.

In Fig. 3, with the center point in the first 8 ends of white, and going to the left for 92 ends, the starting point will be on the 88th end of Grey. This means there will be 88 ends of Grey next to the left hand selvage. The ending point will be 92 ends to the right of the center of 8 White, or on the 68th end of Grey. This means there will be a stripe of 68 ends of Grey next to the right selvage. The pattern is not centered.

Using the center in the 12 ends of Blue, 92 ends to the left gives a stripe of 78 ends of Grey next to the left selvage. Moving 92 ends to the right gives a stripe of 78 ends of Grey next to the right selvage. The pattern is centered with a fairly wide stripe of the subdued color at each selvage. This is very practical.

With the center in the second group of 8 ends of White, 92 ends to the left gives a stripe of 68 ends of Grey next to the left selvage, and 88 ends of Grey next to the right selvage. The pattern is not centered.

If the center is taken in the 100 ends of Grey, the starting point is 92 ends to the left, which will give a 14-end Grey stripe next to the left selvage and a 14-end Red stripe next to the right selvage. This pattern is not centered and different color stripes are next to opposite selvages.

Another trial would be to center in the 24 ends of White. Moving 92 ends to the left will make a Grey stripe of 80 ends next to the left selvage, and 80 ends of Red next to the right

selvage. These are different colors, so it is not the best set-up.

Using the center in the 96 ends of Red, a 20-end Grey stripe is next to each selvage. This is centered but will put the Red very close to both selvages.

With the center in the second 24 ends of White, an 80-end Red stripe is next to the left selvage, and an 80-end Grey stripe is next to the right selvage. This is far from ideal.

The final trial is in the center of the second 100 ends of Grey. This gives an 18-end Red stripe at the left selvage and a 14-end Grey stripe at the right selvage which is not centered. Re-arranging the pattern in Fig. 3 with the center in the 12 ends of Blue, ~~the~~ layout is as seen in Fig. 4. Starting with

**Fig. 4**

| | Selv. | 372 ends × 12 repeats | | | | | | | | | + 184 extra | | | | | Selv. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White | 64 | | 8 | | 8 | | 24 | | 24 | | | 8 | | 8 | | 64 |
| Blue | | | | 12 | | | | | | | | | 12 | | | |
| Grey | | 78 | | | | 100 | | | | 22 | 78 | | | | 78 | |
| Red | | | | | | | | 96 | | | | | | | | |

64 White selvage ends, and reading from left to right as well as right to left, the pattern is the same. This shows the centering is correct and the bold stripe of 96 Red ends is away from the selvages.

The cost of dyeing yarn in different shades will vary, even when the same type of dyestuff is used. Therefore, the exact number of ends of each color has to be known, to arrive at a true cost. The pattern must be centered before this can be determined. In any given fabric, the total ends are fixed, but the breakdown into ends of each color may vary, depending upon how the pattern is centered. The layout of the ends in the creel behind the section warper is, also, governed by the centering of the pattern.

From the arrangement as shown in Fig. 4, the total ends of each color is given in Fig. 5.

**Fig. 5**

| | Ends Per Repeat | | Repeats | | | | Extra | | Selv. | | Total Ends |
|---|---|---|---|---|---|---|---|---|---|---|---|
| White | 64 | × | 12 | = | 768 | + | 16 | + | 128 | = | 912 |
| Blue | 12 | × | 12 | = | 144 | + | 12 | | | = | 156 |
| Grey | 200 | × | 12 | = | 2,400 | + | 156 | | | = | 2,556 |
| Red | 96 | × | 12 | = | 1,152 | | | | | = | 1,152 |
| | 372 | | | | | | 184 | | | | 4,776 |

Next month, the warping and slashing layout for this fabric will be discussed.

## 9 Million Bales Of Cotton Consumed During 12 Months Through July 1960

A total of 9.0 million bales of cotton was consumed in the U. S. during the 12 monthly reporting periods ended July 31, 1960, according to the Bureau of the Census. During this period exports of cotton amounted to 7.2 million bales.

The revised figures on the cotton "carry-over" as of July 31, 1960, is 7.6 million bales. This represents a decrease of 1.3 million bales from the July 31, 1959 carry-over of 8.9 million bales and a decline of 1.2 million bales from the July 31, 1958 carry-over of 8.7 million bales.

During the year ending July 31, consumption of linters amounted to 1.4 million bales. Bleachers consumed 0.8 million bales while other consumers accounted for 0.7 million bales. Stocks of linters at the end of the season amounted to 0.5 million bales or 78 thousand bales below the July 1959 level.

Consumption of man-made fiber staple by mills with cotton system spindles amounted to 486 million pounds. Of this total 379 million pounds were rayon and/or acetate.

# Quality Control Measures Discussed By Textile And Needle Trades Division Of The A.S.Q.C.

## EMPHASIS PLACED ON STATISTICAL QUALITY CONTROL AT THE ELEVENTH ANNUAL CONFERENCE, FEB. 16-17

NEW and better ways of obtaining top quality with a reduction in costs were discussed at the 11th annual conference of the Textile and Needle Trades Division of the American Society for Quality Control held at Winston-Salem, N. C., February 16-17.

The discussions covered a wide range of subjects and included numerous success stories concerning statistical quality control. Topics included: the effectiveness of 100% examination; moisture controls and determination; and quality control programs from management's viewpoint.

Several awards were made at the conference. Dame S. Hamby, professor at the North Carolina State College School of Textiles, was cited for distinguished service to the society and N. L. Enrick, professor at the University of Virginia, was presented with the award for the best paper of 1961.

### Moisture Determination

Moisture factors were discussed by J. M. Gould of Barre Wool Combing Co. Ltd.

There are four ways that textile fibers can hold moisture, Gould pointed out. These are mechanically, physically, physico-chemically and chemically. Wool is used as the example.

Mechanical affinity occurs when the fibers hold moisture in the manner that a sponge does. Physical affinity extends, in wool, from 31% moisture to about 11%, and here the evaporation rate is approximately proportional to the moisture content of the fiber.

Physico-chemical bonding is the area where removal of moisture from the fiber requires considerably more energy input. Still referring to wool, the range is from near 11% down to less than 5%. Rate of removal is not directly proportional to regain but may be represented as proportional to regain plus a constant, he said.

The final way textile fibers hold moisture is by chemical affinity—water of chemical construction in an amount less than 5%. The rate of loss is slow and removal of the last 2% may be accompanied by obvious physical evidence of chemical change or destruction.

In determining moisture content the most usual methods have employed oven drying. However, displacement of water by distillation with a higher boiling immiscible solvent has been proposed for use as a reference method, if not for routine analysis, Gould emphasized. Electrical methods which make use of changes in either resistance or dielectric constant with change in moisture content have been introduced.

In view of problems encountered in making rapid, commercially accurate, moisture tests, Gould stated, it is not surprising that increasing use is being made of secondary test methods. The previously mentioned electrical systems calibrated to primary standards are promising solutions to the problems, he said.

A number of resistor-type instruments have been developed which are portable and are used extensively in control-type applications. They, however, cannot be used for accounting purposes or other precise determinations because of small sample size and sensitivity to wet spots which form a conducting path and short circuit the true or average reading.

However, he continued, instruments employing measurement of the dielectric constant, can be free of this objection. These units have been designed for specific sample size ranges and packages such as wool tops, cones of yarn and baskets of scoured wool. They have stable electronic circuits and excellent mechanical construction in an instrument capable of obtaining a meter reading convertible to moisture content in a matter of 20 to 30 seconds. Many sources of error can be eliminated with this method because samples up to 20 pounds can be used, he said.

Gould summarized by stating that with a means of precise moisture determination available, certain other factors must be considered if accurate moisture content data is to be produced.

Continuing, he said, that under adverse circumstances, moisture content is far from a static characteristic. The principle of simultaneous weighing of the package and sampling for moisture content must be followed if the reported result is to have meaning.

### Quality Evaluation

Harold J. McIsaac, Quartermaster Research and Engineering, discussed new systems of grading and acceptance of fabrics from the mills.

McIsaac felt that the statement of requirements in government specifications represents the culmination of research and development processes, and is a final policy statement in which a great many people have participated. He said that in the Army Quartermaster Corps, which is concerned with many types of textiles, an attempt has been made to include the experience of government, procurement and inspection personnel and the textile industry in policy statements. These were incorporated in Military Standard 105, which provides a means for the acceptance of goods in terms of acceptable quality levels and by the use of a classification of defects as major or minor, he said.

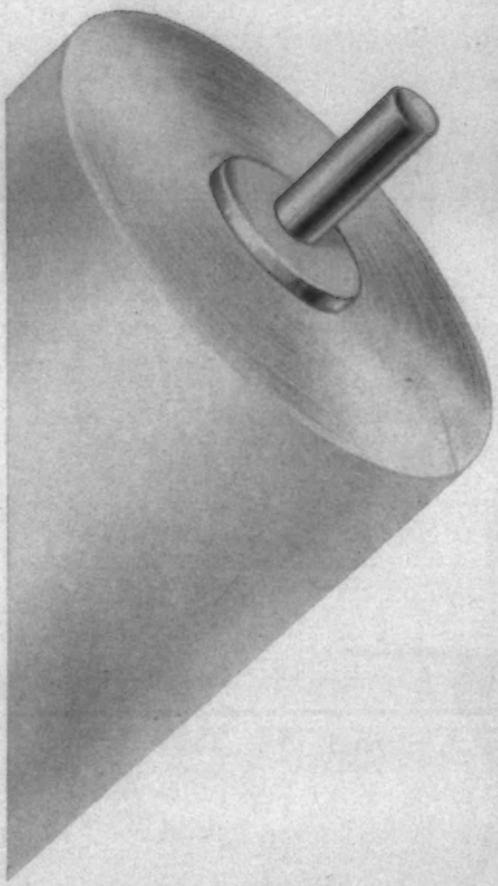
In the textile field, many mills have in the past expressed themselves as being concerned first of all with producing the quality called for by the specifications, McIsaac continued. This is in itself indicative of the fact that the mills' quality control program left something to be desired. In place of this attitude, the Quartermaster Corps has been trying to get the

# PROFIT

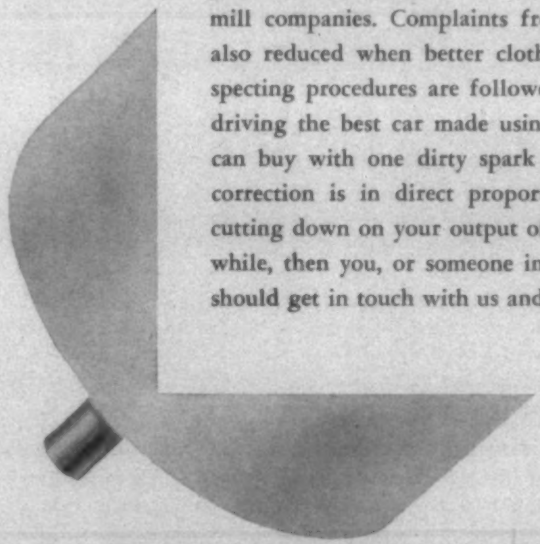
**IN FIRSTS . . or**

# LOSS

**IN SECONDS**



The difference in price you can get for Firsts over Seconds can give you the best Cloth Rooms in the world. And Cloth Rooms equipped with modern C & M machines catch operational mill errors faster — in opening, carding, spinning, slashing and weaving . . . can cut down the amount of Seconds sometimes as much as 100%! Alert mill management is becoming increasingly aware of the importance of better Cloth Room operation and its effect on their profit picture in plain dollars and cents . . . especially in multiple mill companies. Complaints from Converters are also reduced when better cloth finishing and inspecting procedures are followed. It's sort of like driving the best car made using the best gas you can buy with one dirty spark plug. The cost of correction is in direct proportion. If you think cutting down on your output of Seconds is worthwhile, then you, or someone in your organization should get in touch with us and talk it over. Now.



HEADQUARTERS FOR FINE CLOTH
FINISHING MACHINERY SINCE 1831

## CURTIS & MARBLE MACHINE CO.

72 CAMBRIDGE STREET • WORCESTER 3 • MASSACHUSETTS
SOUTHERN SALES & SERVICE • LAURENS ROAD • GREENVILLE, S. C.

contractors to think in terms of themselves producing the quality called for by the specifications and not concerning themselves whether or not the Quartermaster Corps is going to accept the product.

Continuing along the same lines, McIssac said that if the mills are producing up to specifications, there are going to be no problems as to whether the goods will be accepted or not. The policy of mandatory contractor inspection has necessitated a new understanding on the part of the contractor with respect to quality evaluation of his product over anything which most manufacturers in this field have been aware of in the past.

McIssac outlined a major change in the Quartermaster Corps' method of evaluating quality of textiles that it procured. He said that a specific proposal was presented to the Industrial Advisory Committee on June 2, 1960, containing two major parts. These were:

(1) Proposed definitions of fabric defects—this portion defined all of the fabric defects classified in the yard-to-yard examination and the overall examination in present military fabric specifications; and (2) the method for determining acceptability of cotton fabrics.

The second part of the proposal sent the committee contained:

(a) All defects listed in the proposed definitions were to be assigned points as follows:

For defects up to three inches in any dimensions—one point.

For defects exceeding three inches in any dimension, but not exceeding six inches in any dimension—two points.

For defects exceeding six inches in any dimension, but not exceeding nine inches in any dimension—three points.

For defects exceeding nine inches in any dimension—four points.

(b) All defects of the "overall" type were to be assigned four penalty points for each yard in which they occur.

(c) The maximum number of penalty points to be assigned to any one yard would not exceed four.

(d) Calculations were to be on the basis of 100 square yards.

$$\frac{\text{Number of penalty points in sample} \times 36 \times 100}{\text{Yardage in sample} \times \text{width of fabric}} = \text{Point value per 100 sq. yds.}$$

McIssac summarized by saying that the adoption of the point system for cotton fabrics is only the beginning.

"We plan to adopt this system in other type goods, and to study its application for use in fabricated items. We hope our efforts will enjoy the co-operation of the industries concerned, for it is in their interest, as well as the government's, that we are expanding our efforts."

### Random Balance

In discussing Random Balance, Dr. H. A. Prado, Owens-Corning Fiberglas Co., Anderson, S. C., defined it as "a random sample taken from a complete factorial experiment dealing with all the known variables affecting a process." He continued by saying that the purpose of a random experiment is to screen the variables that are responsible in the most part for the excessive variation of the product.

By use of Random Balance experimentation, the speaker explained, an attempt to identify the variables that are responsible for most of the variation is made. "I can say that these purposes can be achieved, according to my own personal experiences," he said. "Once you have identified your variables, you must use other statistical tools if you are to estimate quantitatively the effects that each one has in your process."

There are some alternatives to Random Balance, Prado said. These are: (1) fractional factorial experiments; (2) Latin squares; (3) Graeco-latin squares; (4) Hypergraeco-latin squares; and (5) Plackett-Burman designs.

The design and analysis of these types of experiments will be best carried out by a person with experience in their use and with good knowledge of their underlying theory, all of which is indispensable for interpreting the results correctly, reported the speaker.

The design of Random Balance is divided into six sections, according to the speaker—selection of variables, apportioning of levels, characteristics to be measured, the number of runs to be made, randomization of variables and levels and scheduling and follow-up.

According to the mal-distribution principle by which only a few of all variables considered are responsible for most of the variation, the experiment will identify the chief variables if they are programmed in the experiment, Prado reported. For this reason, the effectiveness of the design depends heavily on the personal experience that the designer has with the process he is concerned with, he said.

It is advisable to include all the variables suspected to have any influence in the process. Most experiments are treated with only 10 or 12 variables, but at Owens-Corning, experiments have been designed with 32 variables.

It is possible that a variable will be overlooked, he explained. If this is an important variable, the analysis will show a rather large unexplained variation; even so, he continued, if the experiment has not identified the unknown variable, at least it will be known to investigate further.

For each variable that is included in the experiment, he said, there will have to be at least two levels programmed in it. Prado suggested the following as relevant in this matter:

(1) The two levels selected should be within the normal range of the process. That is, not wide enough to introduce deliberately an effect that will disrupt the whole works and not so small as to make any difference negligible.

(2) If a program in the experiment factors that are measured qualitatively—like good, regular, bad, etc. (discrete variables)—is desired, three levels should be programmed so that influences in the process traceable to these variations can be better detected.

The speaker stressed the importance of this. He said that suppose a person wanted to know how the breaking strength of his fibers or cloth is affected by the variables that he is including in the experiment. He should make sure that other characteristics equally desirable are not adversely affected when he starts improving breaking strength. It would be a good idea, according to Prado, to provide for measurement of all other characteristics or properties of the product.

Prado quoted the following determinants for the number of runs from Mr. F. J. Anscombe of Princeton University in his article in *Technometrics,* May 1959, p. 205.

"If all factors are at two levels, *n* (number of runs) should not be less than 16.
"If some factors are at three levels, *n* (number of runs) should not be less than 25.
"If some factors are at four levels, *n* (number of runs) should not be less than 32.
"If some factors are at five levels, *n* (number of runs) should not be less than 39."

Prado said that there are several methods for analyzing the results given by a random balance experiment. Graphical





analysis was described by the speaker as being the easiest and at the same time the most objective for the analyzer as well as other persons interested in it. Graphical analysis, he explained, is the simple study of scatter plots where the results of the experiment are recorded.

Once the variables have been identified, one alternative might be to take action in the direction indicated by the results of the experiment, Prado continued. The experiment provided Owens-Corning with the general direction to go to reduce adverse effects.

Prado summarized by saying that optimization is designed to allow the finding of the combination of variables and levels at which the response, yield or measured characteristics is optimal. Factorial experiments or fractional factorial experiments are indicated for this purpose. For the best optimization results, Prado recommended G. E. Box's techniques for response surface exploration.

## The Fibrogram: Its Concept And Use

*(Continued from Page 57)*

angle $\theta$ is the angle between this tangent and the L axis, and;

$$\text{Tangent } \theta = N\bar{L}/\lambda \qquad \text{Eq. 15}$$

The tangent at any point on the fibrogram equals the area under the Q-curve to the right of that point. Therefore:

$$N\bar{L}/\lambda = N \qquad \text{Eq. 16}$$

$$\bar{L} = \lambda \qquad \text{Eq. 17}$$

This shows that the distance from the origin to where the tangent drawn at L equals zero intersects the length axis is the mean fiber length.

The Upper-Half Mean length can be obtained by drawing a line tangent to the fibrogram and through a point on the vertical axis that divides the original fiber array into two equal parts by weight. This point will be one-half of $N\bar{L}$ because $N\bar{L}$ represents the total weight in the original array. The distance from the origin to where this tangent intersects the length axis is the U.H.M. length and is shown in Fig. 7b.

### Acknowledgments

The author wishes to acknowledge Drs. K. L. Hertel and C. J. Craven for their assistance in preparing the present paper and to express gratitude to P. R. Ewald, Drs. S. Worley and T. Kerr for their many comments and suggestions and to Miss Catherine Waggoner for the fiber arrays, plotting and calculations.

### Literature Cited

1 Hertel, K. L., Method of Fiber Length Analysis Using the Fibrograph, *Textile Research Journal*, 10 (1940) pp. 510-525.

## Cotton Research Clinic And Cotton Marketing Council To Meet May 13-17

The close kinship between problems in cotton marketing and research efforts in fiber processing and technology will be pointed up during a joint meeting of the Cotton Research Clinic and the Cotton Marketing Conference, May 16-17 in the Peabody Hotel, Memphis, Tenn. In the past, both have been sponsored by the National Cotton Council in co-operation with other groups.

Started 11 years ago, the research clinic has brought operating cotton textile mill executives and scientists together to discuss developments in fiber and processing technology. The marketing conference, held for the first time this year, was

devoted to results in fiber quality research, marketing research needs, and selection of cottons to meet specific performance requirements.

Topics on the program for the joint meeting in May will be of direct interest to farmers, ginners, merchants and spinners. Subjects will include the relation of fiber properties to manufacturing performance, a producer's view of fiber measurement, and an evaluation of where we now stand in measuring quality. Progress in moisture control in gins also will be reviewed, and a panel will survey current fiber evaluation research.

## John H. Bolton Jr. Named President Of American Textile Machinery Association

John H. Bolton Jr., vice-president of Whitin Machine Works, Whitinsville, Mass., was elected president of the American Textile Machinery Association at the group's 28th annual meeting recently in Boston. He succeeds William K. Child, vice-president of Draper Corp., Hopedale, Mass., who has headed the association for the past two years.


**Bolton Jr.**


**Pennock**


**Brigham**

Robert S. Pennock, vice-president, Leesona Corp., Providence, R. I., was elected vice-president and was made, also, a member of the board of directors. F. Gorham Brigham Jr., who has served as treasurer for the last four years was re-elected to that post for the fifth consecutive term. Brigham is financial vice-president of EPSCO Inc., Cambridge, Mass.

Directors-at-large for 1961, elected also at the meeting, include Bolton, Pennock, Child and J. E. Butterworth, president, H. W. Butterworth & Sons Co., Bethayres, Pa.; Roy G. Ross, vice-president, Barber-Colman Co., Rockford, Ill.; W. Frank Lowell, president, Saco-Lowell Shops, Boston, Mass.

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Mrs. Mildred Gwin Andrews was reappointed executive secretary.

## Woolen And Worsted Production In The Fourth Quarter Down 12%

Woolen and worsted fabric production during the fourth quarter of 1960 was 60.1 million finished linear yards or 12% below the third quarter 1960 level and 15% below the output during the comparable period of 1959.

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period and 13% below the fourth quarter 1959 level. Men's and boys' clothing fabric production declined 10% from the previous quarter's level and was 24% below the output during the fourth quarter of 1959.

Production of woolen and worsted fabrics in New England amounted to 27.7 million yards, or 17% below the previous quarter's output. Production in the Southern states amounted to 26.8 million yards or 5% below the previous quarter's level. All figures are from the Bureau of the Census.

**Production Of Woolen And Worsted Goods By Type Of Fabric—Fourth Quarter 1960**

| Type of Fabric | Oct.-Dec. 1960 | July-Sept. 1960 | Oct.-Dec. 1959 |
|---|---|---|---|
| | 1,000 Finished Linear Yards | | |
| Woolen and Worsted Fabrics, (Except Felts), Total | 60,058 | 68,507 | 70,933 |
| Apparel Fabrics | 58,555 | 66,974 | 69,254 |
| Men's and Boys' Clothing | 22,298 | 24,838 | 29,216 |
| Women's and Children's Clothing | 34,748 | 41,741 | 39,929 |
| Nonapparel Fabrics | 1,503 | 1,533 | 1,679 |

## N. C. State School Of Textiles To Offer Three Summer Short Courses

North Carolina State College School of Textiles has released details of its three short courses to be offered during May and June of this year. The courses are: "Statistical Quality Control for the Textile Industry," "A Short Course for Executives of the Textile Industry" and "Textile Course for the Furniture Industry."

Both the quality control course and the short course for executives are two-week courses with seven hours of instruction per day. Fee for these courses is $160 each, which includes tuition, supplies and text materials. Meals and accommodations are not included.

The quality control course has been designed to provide ten days of intensive practical training in the basic concepts of modern quality control techniques and their application to the textile industry. Instruction for the course will be under the direction of Prof. D. S. Hamby of the Department of Textile Technology. Assisting as full-time instructors are Dr. R. J. Hader, Department of Experimental Statistics, and Prof. W. C. Stuckey Jr., Department of Textile Technology. Following is the schedule for the course:

**FIRST WEEK, MAY 15-19, 1961**

**MONDAY**
Registration and Introduction
Populations and Samples
Frequency Distributions
Methods of Calculation and Interpretation of Standard Deviation
Practice Problems

**TUESDAY**
Calculations of Coefficient of Variation and Applications to Textile Processes
Statistical Quality Control Charts
Practice Problems and Case Studies

**WEDNESDAY**
Statistical Quality Control Charts
Applications, Case Studies and Practice Problems

**THURSDAY**
Quality Control Systems by Areas for Textile Plants
Interpretation and Application of Testing Data to Manufacturing Processes

**FRIDAY**
Application of Quality Control Techniques with Case Studies
Review with Question and Answer Period

**SECOND WEEK, MAY 22-26, 1961**

**MONDAY**
Tests for Significance of Differences and Confidence Intervals Applied to Textiles

**TUESDAY**
Continuation of the Application of Significance Testing and Confidence Intervals to Textiles, with Practical Problems
Correlation and other Relationships of Variables as Related to Textiles

**WEDNESDAY**
Applications of Correlation to Textile Problems
Analysis of Variance

**THURSDAY**
Case Studies in the Use of Analysis of Variance
Sampling Theory as Applied to Continuous Production and Lot-by-Lot Inspection

**FRIDAY**
Continuation of Sampling Theory and Special Applications of Statistical Techniques to Textile Quality Control Problems

The executives' short course is designed primarily for the

non-textile college graduate now employed in the textile industry at executive levels. A college degree is not required for registration in this course. It will be under the direction of Prof. Elliot B. Grover, head of the Department of Textile Technology. Full-time instructors include Profs. E. B. Berry, J. F. Bogdan, K. S. Campbell, D. S. Hamby, J. W. Klibbe, W. E. Moser, B. L. Whittier and R. E. Wiggins. The course begins June 5 and will cover the following subjects:

Fiber quality of cotton including varieties, areas, and physical properties.
Fiber quality of man-made fibers, including classification, outstanding properties, and properties that influence end use.
Yarn numbering systems and conversion constants.
Textile calculations including constants with laboratory demonstrations.
Cotton system of processing.
Spinning limits for cotton, synthetics and blended yarns.
Fiber evaluation of natural and man-made fibers by spinning tests and analysis of sample production.
A study of twist including the influence of twist on physical properties.
Types of looms, their uses, limitations, etc.
Fabric design and construction.
Fabric analysis and characteristics.
Fabric defects.
Blending of cottons and cotton with other fibers: methods, yarn characteristics, etc.
Processing of continuous filament yarns, including textured yarns.
Mill balance and organization for different types and contruction of yarns.
Quality control systems.
Applied quality control.
Testing techniques and instruments.
Survey of end use aspects of yarn for the knitting and weaving trades, types of fabrics produced, and market requirements.
Survey of fabric finishing including the different classifications of finishes and dyes for various fibers and products.

The first week of the course will be common to all persons registered. For the second week, the enrollees will be divided into two sections: one section for those primarily interested in yarn manufacturing, and one section for those primarily interested in weaving.

The furniture course is designed to acquaint personnel of the furniture industry with fabric testing and analysis methods, fiber properties and basic constructions. A four-day course, beginning May 2, it is under the direction of Prof. B. L. Whittier of the Department of Textile Technology.

Registration can be made with the Division of College Extension, N. C. State College, Raleigh, N. C.

## Corduroy Council Names Officers

The Corduroy Council of America, New York City, has announced the election of officers for the forthcoming year. Harvey Raymond, vice-president of Cone Mills Inc., was named chairman of the council and of the executive committee, a group of seven members responsible for the overall policies of the council. Other officers are: treasurer, Robert Eisen, Greenwood Mills; and secretary, Walter Montgomery Jr., Spartan Mills.

In addition to the above officers, newly-elected members of the executive committee are: Saul Eisenberg, Brookhaven Textiles; Arthur Henninger, Dundee Mills; Charles Simon, McCampbell & Co.; and Harold Horstman, Hockmeyer Bros. These are chosen to represent all elements of the corduroy industry; integrated operators, semi-integrated, converters, and greige mills.

Participating members of the Corduroy Council, which represents over 90% of the corduroy production in the U. S. are:

Finished Goods: Brookhaven Textiles Inc.; Cone Mills Inc.; Crompton Richmond Co. Inc.; Eden Textiles; Greenwood Mills Inc.; Hockmeyer Bros. Inc.; Majestic Mills Inc.; McCampbell & Co. Inc.; Merrimack Mfg. Co. (1959) Inc.; J. P. Stevens & Co. Inc.

Greige Goods Members: Dan River Mills; Dundee Mills; Greenwood Mills; Jefferson Mills; Leslie Catlin & Co.; Monarch Mills; Scottdale Mills; Spartan Mills; J. P. Stevens & Co. Inc.; and Whittier Mills.

A promotional program, consisting of five mailings to buy-

ing offices and retail stores, is being undertaken by the council this Spring. This includes special colors, prints and plains, selected for promotion, as well as highlights of corduroy fashions chosen from the men's, women's and children's wear markets.

## January Woolen And Worsted Fiber Consumption Up 17% From December

The weekly average rate of fiber consumption on the woolen and worsted systems in January was 17% above the December rate but 24% below the comparable month of 1960, according to the Bureau of the Census. These figures exclude the production of man-made fiber top from tow without combing.

The weekly average raw wool consumption in January was 7,239 thousand pounds (scoured basis) or 16% above the December level and 22% below the January 1960 rate.

Consumption of apparel class wool was 21% above the December rate and 18% below January 1960.

The rate of consumption of carpet class wool increased 9% from the preceding month and was 27% below the comparable period of last year.

Consumption of fibers other than raw wool averaged 4,822 thousand pounds per week. This was 20% above the rate of consumption during the previous month and 27% below the January 1960 rate.

**Fibers Consumed In Woolen Spinning And Worsted Combing—January 1961**
**(Thousands of pounds-scoured basis for greasy wools)**

| Classification | Weekly Average | | |
|---|---|---|---|
| | Jan. 1961 | Dec. 1960 | Jan. 1960 |
| All Fibers, Total | 12,061 | 10,290 | 15,817 |
| Raw Wool | 7,239 | 6,260 | 9,252 |
| Apparel Class | 4,216 | 3,485 | 5,138 |
| Woolen System | 2,019 | 1,547 | 2,361 |
| Worsted System | 2,197 | 1,938 | 2,777 |
| Carpet Class | 3,023 | 2,775 | 4,114 |
| Noils, reprocessed and reused wool, and other animal fibers | 2,500 | 2,257 | 3,324 |
| Man-Made Fibers | 2,003 | 1,536 | 2,851 |
| All Other Fibers | 319 | 237 | 390 |

## A.C.M.I. Plans Fiber Testing Lab Open House, May 3-4, Clemson, S. C.

The 1961 Open House meeting of the American Cotton Manufacturers Institute Cotton Fiber Testing Laboratory will be held at the Clemson House, Clemson, S. C., May 3-4.

The opening session will be held at 9:30 a. m. Wednesday, May 3. At this time those attending will be welcomed by Helen G. Beasley, who is in charge of the A.C.M.I. Fiber Testing Laboratory; Dean Gaston Gage of the Clemson College School of Textiles; and W. W. McLeod, chairman of the A.C.M.I. research and technical service committee.

The first technical session will begin at 10 a. m. and will feature the following presentations: "Quality and Its Measurement in Cotton," George S. Buck Jr., assistant to the vice-president for research, National Cotton Council; "Why the Cotton Merchant Utilizes the Results from the Fiber Laboratory to Increase the Sale of Cotton," G. T. Neumeyer, Otto Goedecke Co., Spartanburg, S. C.; "Cotton Fiber and Pilot Spinning Test Results to Improve Quality and Expand Consumption of High Plains Cotton," George W. Pfeiffenberger, executive vice-president, Plains Cotton Growers Inc., Lubbock, Tex. A demonstration of equipment by machinery representatives will be held Wednesday afternoon.

A second technical session will begin at 9:30 a. m. Thursday, May 4. Presentations will include: "The Effect of Short Fiber Content on the Spinning Performance and Quality of Yarns," E. H. McAngus, research department, West Point Mfg. Co., Shawmut, Ala.; "Cotton Fiber Testing Plays an

Important Part in Controlling Spinning Performance and in the Manufacturing of Quality Fabrics," Charles A. Dean, Russell Mfg. Co., Alexander City, Ala.; "Progress Report on the Digital Fibrograph and Fibrosampler," Joseph T. Rouse, Standards & Testing Branch, Agricultural Marketing Service, U.S.D.A., Washington, D. C.; and "A Review of Some of the Findings and Problems Involved in Cotton Quality Evaluation," Dr. W. T. Pentzer, Market Quality Research Division Agricultural Marketing Service, U.S.D.A., Washington, D. C.

## February Cotton Consumption Shows Slight Increase Over January Total

Total consumption of cotton in the U. S. in February at 637,116 running bales was up slightly from the 636,686 running bales consumed in January but down from the 730,236 in February of 1960.

Foreign cotton consumption totalled 7,694 bales as compared with 7,162 in the previous month and 8,385 in February 1960. Some 33,998 thousand pounds of man-made fiber were consumed in February against 32,746 in January and 38,403 in February of last year. The following table summarizes consumption, stocks and spindle activity for cotton, man-made fiber staple and linters.

| Item | Feb. 1961 | Jan. 1961 | Feb. 1960 |
|---|---|---|---|
| ALL COTTON (Running Bales) | | | |
| Total Consumption | | | |
| United States | 637,116 | 636,686 | 730,236 |
| Cotton-Growing States | 612,168 | 612,282 | 701,432 |
| New England | 22,227 | 21,693 | 25,557 |
| Daily Average Consumption | | | |
| United States | 31,856 | 31,835 | 36,512 |
| Cotton-Growing States | 30,609 | 30,614 | 35,072 |
| New England | 1,111 | 1,085 | 1,278 |
| Index of Cotton Consumption Adjusted for Seasonal Variations (1947-1949 = 100) | 90 | 91 | 103 |
| Stocks, Total | 11,695,387 | 12,837,223 | 13,177,519 |
| Consuming Establishments | 1,838,493 | 1,691,930 | 1,968,738 |
| Public Storage | 9,856,894 | 11,145,293 | 11,208,781 |
| Exports | (NA) | 979,409 | 839,357 |
| FOREIGN COTTON (Equivalent 500 lb. Gross Weight Bales) | | | |
| Total Consumption | 7,694 | 7,162 | 8,385 |
| Stocks | 64,875 | 73,235 | 63,398 |
| Imports | (NA) | 374 | 6,161 |
| MAN-MADE FIBER STAPLE (Thousand Pounds) | | | |
| Total Consumption | 33,998 | 32,746 | 38,403 |
| Stocks | 33,590 | 32,072 | 45,041 |
| Imports | (NA) | 3,308 | 5,810 |
| COTTON-SYSTEM SPINDLES | | | |
| In Place (thousands) | 19,793 | 19,881 | 20,083 |
| Active (thousands) | 19,063 | 19,022 | 19,371 |
| Hours Operated (thousands) | 8,940 | 8,760 | 9,994 |

## Alabama Textile Manufacturers To Meet April 13, Biloxi, Miss.

The Alabama Textile Manufacturers Association will hold its 1961 annual meeting April 13 in the Buena Vista Hotel, Biloxi, Miss.

The first business session is scheduled for Thursday morning at 10 a.m. At that meeting the Comer safety trophies will be presented and a safety report will be made by George R. Hooper, Anniston (Ala.) Cordage Co., safety chairman. Following this committee reports will be made by the committees on cotton policy, cotton improvement, industrial relations, public relations, Alabama textile operating executive, and Georgia-Alabama textile traffic association.

During the second business session Thursday afternoon, Donald Comer Jr., executive vice-president of Avondale Mills and retiring president of the association will make his report. Joe L. Lanier, president of West Point (Ga.) Mfg.

Co., will discuss "Alabama's Need for Textile Graduates." The election of officers will follow.

A buffet supper, costume party and floor show and dance will make up Thursday evening's activities.

Speaker at the final business session Friday morning will be L. E. Oliver, Southeastern district vice-president of Sears, Roebuck & Co.

Golf and horseshoe tournaments will be held Friday afternoon with awards presented at the banquet that night.

## Clemson Textile School Plans Summer Short Courses For Industry

Courses designed to increase the knowledge and efficiency of personnel in the textile industry and related fields will be offered in Summer short courses at the Clemson College School of Textiles beginning June 12.

"Yarn manufacturing and fabric development courses," said Dean Gaston Gage, "are especially recommended for college graduates, other than textile school graduates, who plan to enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those going into the various staff fields. High school graduates will also benefit from these courses."

The yarn manufacturing course includes study of raw materials, blending, theory of production, necessary adjustments and calculations, basic ideas of management and discussion of the necessity of technological advances.

The fabric development course will cover the principles of operation of both the cam and dobby loom. Basic design of woven textile fabrics will be studied as well as the necessary plans, details and calculations involved in weaving a fancy fabric.

The supervisor development course is designed to serve supervisors, potential supervisors and general overseers. The subject matter will be general and not confined to any one field of textile operation. Especially emphasized will be the need of self-analysis on the part of the supervisor and the qualifications of a good supervisor.

The course dealing with quality control is set up for those working in quality control with little formal training. Main objective of the course will be the teaching of techniques and applications.

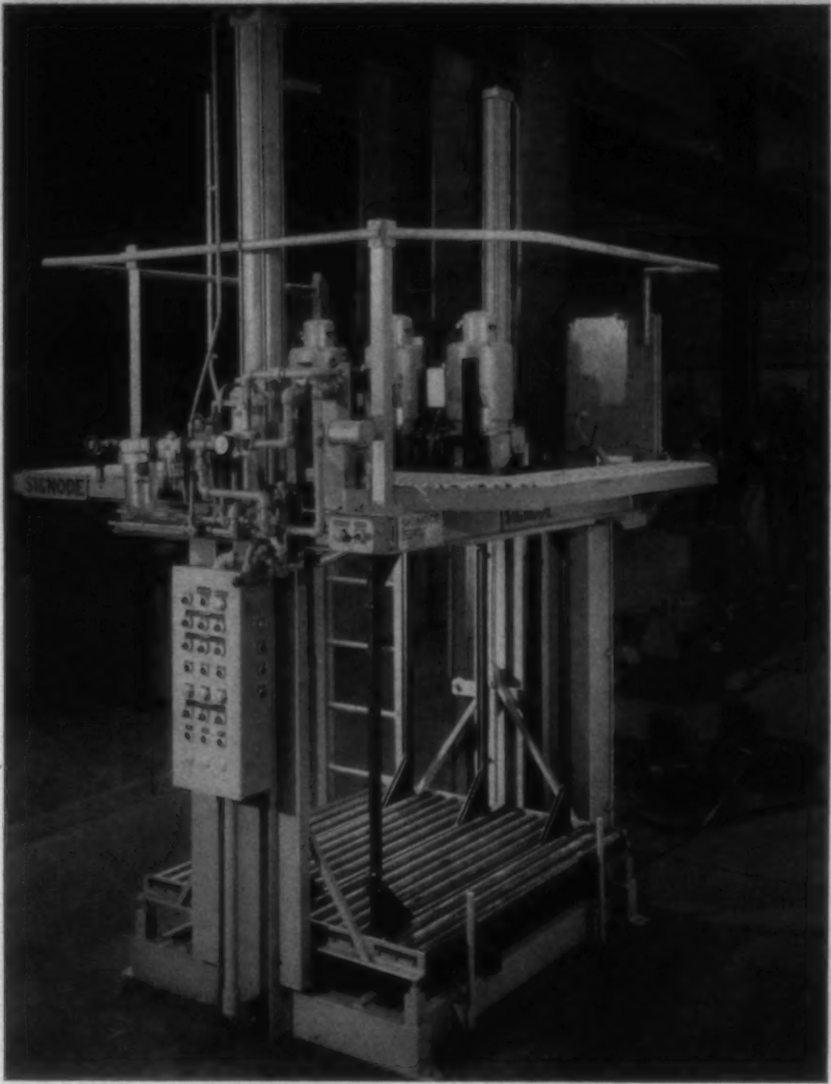
The motion and time study course is particularly suited to those working in standards departments who need additional training. Some of the topics of study will be general functions and responsibilities of the standards department, principles of motion economy with applications, methods analysis techniques, procedures for determining machine assignments and piece rates, use of standard data, work sampling and wage incentives.

## Cotton Utilization Research Meeting Scheduled For May 1 In New Orleans

Recent advances in cotton utilization research will be the subject of a three-day conference between industry and members of the Southern Utilization Research & Development Division research staff, beginning May 1 in New Orleans, La., according to an announcement by Dr. C. H. Fisher, director of the division.

Earl Heard, vice-president, research, of West Point (Ga.) Mfg. Co., will serve as general chairman for the meeting. Chairmen for the various sessions will be George S. Buck Jr., technical assistant to the executive vice-president, National Cotton Council of America, Memphis; Lawrence L. Heffner,

*For automatic production line packaging of textiles...*



# New Signode Texomatic compression strapping machine

The Texomatic is designed specifically for the textile industry with a compression capacity of 2,000 pounds. It is powered by three M-20 power strapping units that simultaneously and automatically feed, tension and seal three straps. Each of these 3-horsepower units is powerful enough to prevent overloading at fast speeds and high strap tensions. Even the conveyor is powered. All the operator does is push one button to compress and strap, another to convey the package.

For further information on the Signode Texomatic, call the Signode representative near you or write:

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**STEEL STRAPPING CO.**
**2665 North Western Avenue • Chicago 47, Illinois**

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*First in steel strapping*

cotton utilization specialist, North Carolina State College School of Textiles, Raleigh; Louis L. Jones Jr., president, Canton (Ga.) Cotton Mills; and C. Norris Rabold, director of research, Erwin Mills, Cooleemee, N. C.

## Peterson Named Board Chairman Of The Textile Research Institute

Dr. Russell W. Peterson, technical director of the new products division of the Du Pont Co., Wilmington, Del., has been named chairman of the board of Textile Research Institute. Dr. Peterson succeeds William E. Clark, vice-president and general manager of the textile division of U. S. Rubber Co.

Other new corporate officers are: vice-chairman of the board, G. T. Gardner, executive vice-president of Riegel Textile Corp.; chairman of the finance committee, Levon M. Yacubian, vice-president and general manager of the Barre Wool Combing Co., South Barre, Mass.

New members of the board of trustees are: Dr. Robert T. Armstrong, vice-president and technical director, Celanese Corp. of America; Dr. D. W. Chaney, executive director, Chemstrand Research Center, Durham, N. C.; Dr. Bertrand W. Hayward, president of the Philadelphia College of Textiles & Science; L. O. Koons, president of Scholler Bros., Philadelphia, Pa.; Richard T. Kropf, vice-president and director of research, Belding Heminway Co.; Dr. Paul B. Stam, director of research, J. P. Stevens & Co., Greensboro, N. C.

Promotions, Resignations, Honors, Transfers, Appointments, Elections, Civic and Associational Activities

# PERSONAL NEWS

Wilkinson

Vernon L. Wilkinson has been named sales engineer of B. F. Perkins & Son, Holyoke, Mass., producer of textile finishing equipment. Wilkinson was associated for 12 years with Rodney Hunt Machine Co., Orange, Mass., where he served as field service engineer, laboratory and patent supervisor and finally as sales engineer. He was serving as new products manager of Curtis & Marble Machine Co., Worcester, Mass., prior to joining Perkins.

Marion W. Stribling has been named vice-president of manufacturing of Habersham (Ga.) Mills, producer of carded yarns. Stribling, who has been superintendent of Habersham since 1946, is also a member of the board of directors of the firm. Prior to becoming associated with Habersham, he was employed by the Whitin Machine Works, Whitinsville, Mass.

Lawson

Dr. J. Keith Lawson Jr. has been promoted to scientist in the newly-created research scientist program within the Chemstrand Research Center Inc., Durham, N. C. The first person to be selected for this program, Lawson is an organic chemist and has been serving as group leader of the Acrilan finish group. He will be engaged in polymer and synthesis research. Lawson received his B.S. degree in chemistry from the University of Maryland in 1938 and his Ph.D. in organic chemistry from the University of Minnesota in 1942. Before joining Chemstrand in 1951, he was associated with The Du Pont Co., Newark, N. J., and the American Viscose Corp., Marcus Hook, Pa. Lawson is a member of the American Chemical Society.

Willis

C. B. (Brad) Willis Jr. has joined the Greensboro Loom Reed Co. and its subsidiary, The Greensboro Industrial Platers, as sales representative. A native of Greensboro, he was formerly with the Monroe Calculating Machine Co.

Charles J. Chaban has been appointed to the position of vice-president of the American Finishing Co.'s newly established research and development division. Chaban is a widely-known authority in the textile coating and finishing fields, particularly automotive. He joins American Finishing after 18 years as vice-president of the coated fabrics division of the Interchemical Corp.

William H. Kieffer has been appointed director of marketing, fibers division, American Cyanamid Co., New York City. He will co-ordinate sales and merchandising operations for Creslan acrylic fiber. Formerly engaged with the Ciba Co. Inc., he is a member of the American Association of Textile Chemists & Colorists and the Synthetic Organic Chemical Manufacturers Association.

Robert Drainville, formerly assistant treasurer of the Bachmann Uxbridge Worsted Corp., has joined the Whitin Machine Works, Whitinsville, Mass., as general accountant in the corporate financial department. Drainville had been associated with Bachmann Uxbridge for 25 years and is widely known in wool and worsted mill circles.

Anderson

G. M. Anderson has been named assistant sales manager of the corn refining division of Penick & Ford Ltd. with headquarters in Atlanta, Ga. The scope of his assignment covers sales and service activities in textile, food and paper industries. He was formerly manager of the textile division of technical sales service and field development. He joined Penick & Ford in 1939 and rose to positions of responsibility in the technical sales division. . . . J. R. Heard has been appointed manager of the textile division of technical sales service and field development. Heard received his bachelor's degree in chemical engineering at Georgia Tech. His industrial experience includes the manufacture of textile equipment, production of synthetic fibers and textile mill operations. He joined Penick & Ford's technical sales service division in 1956.

Richard F. Siefert has been appointed to the newly-created position of manager of filament winding marketing for the fiber glass division of Pittsburgh (Pa.) Plate Glass Co. He had served in Chicago as the fiber glass division district sales manager during the past year. Siefert joined Pittsburgh Plate's fiber glass plant in Shelbyville, Ind., as a laboratory assistant in 1953.

He is a graduate of Purdue University and a member of the Society of Plastics Engineers. . . . Carl H. Luther has been named to succeed Siefert as district sales manager for the Chicago office. Formerly sales representative for the Midwestern sales office, Luther has been associated with the company's fiber glass division during the past seven years.

Suber

Henry W. Suber, assistant general manager, Rock Hill Group, J. P. Stevens & Co., Great Falls, S. C., has been appointed to the board of governors of the Southern Textile Association. A graduate of Clemson, Suber has served in various capacities with Stevens since 1933. His interim appointment to the S.T.A. board fills the vacancy created by the resignation of a former Stevens official, R. Carter Henry of Piedmont, S. C. Henry resigned last year as assistant general manager of the Cotton Division of J. P. Stevens to enter the general investment business.

George T. Gardner, executive vice-president and director of Riegel Textile Corp., has been appointed textile chairman of the commerce and industry section of the 1961 fund campaign for the American Red Cross in Greater New York. As textile chairman, Gardner will organize the activities of volunteers as they seek contributions from textile companies.

Van N. Ruffner, formerly personnel manager of Scandinavian Airlines System Inc., has joined Roberts Co., Sanford, N. C., as personnel director of the textile machinery manufacturer. Ruffner received a B.A. in psychology and education from Duke University in 1950 and was awarded an M.A. degree in vocational guidance and counseling at Columbia University in 1951.

Loughlin

Kenneth C. Loughlin has retired as president of Celanese Corp. of America. Loughlin joined Celanese in 1929 after graduation from North Carolina State College School of Textiles. In 1951 he was appointed vice-president of Southern fiber sales for Celanese and in the following year, became vice-president and general manager of the Celanese Fibers Division. He was named president last year and has been a director since 1954. He will continue in that capacity. Harold Blancke will assume the office of president and will continue as Celanese's chief executive officer. Blancke also holds the office of chairman. . . . In other administrative changes, Celanese announced that James R. Kennedy, recently elected executive vice-president, will direct corporate financial planning and administration; maintenance of relationships with stockholders and the financial community; and industrial relations and public relations. John W. Brooks, executive vice-president of domestic operations, has the responsibility for guiding the development and administration of the corporation's four domestic operating companies. After being appointed vice-president and general manager of the fibers division in 1956, Brooks later became a corporate vice-president and president of the fibers company. Richard W. KixMiller, executive vice-president of international operations, has been made responsible for the management of Celanese interests in operations and activities outside of the U. S., including all foregn affiliates and subsidiaries; activities relative to foreign mergers, acquisitions and developments; licensing and technical service contracts and export sales. He has been a director of Celanese since 1956.

Ray M. Gordon has been promoted to the position of office manager for the textile division headquarters of The Kendall Co. in Charlotte, N. C. Gordon joined the Kendall organization in 1944 and for the past seven years has been connected with the company's research department, located at Paw Creek, N. C. He is a past president of the Textile Quality Control Association as well as a member of the American Society for Quality Control.

S. F. Adams, Southern sales manager of American Paper Tube Co., Providence, R. I., has been named general sales manager of the company.

C. A. Brier has been named product sales manager, resin chemicals, of the Newport Industries Division of Heyden Newport Chemical Corp., New York City. Brier join-

ed the company as a technical sales representative in 1957 for the New Jersey area. He is a graduate of Pratt Institute and attended Long Island University and Polytechnic Institute, majoring in chemical engineering. Brier is a senior member of the American Chemical Society and the Division of Organic Coatings and Plastics Chemistry and a member of the American Association for the Advancement of Science.

William A. Richardson has been appointed associate sales manager for the fiber marketing department of Allied Chemical's National Aniline Division, New York City. Richardson will be responsible for the sale of Caprolan nylon to textile customers in the Southern states.

George W. Cumbus, vice-president of J. E. Sirrine Co., Greenville, S. C., and head of its structural department, has retired because of ill health. With the company for 22 years, he had been a partner since July 1952 and a vice-president since January 1956. Several changes in the administrative staff were necessitated by his retirement. J. H. Bringhurst Jr. was named head of the structural department and M. M. Stokely was named first vice-president. Bringhurst had been an assistant in the structural department and was made a partner in 1954 and a vice-president in 1956. Stokely has been with Sirrine for 19 years and has been a partner and vice-president for the past few years.


Aiken

Bob Aiken has joined the sales staff of the textile products division of Texize Chemicals Inc., Greenville, S. C. Aiken received his degree in textile manufacturing at Clemson College in 1958, but worked his senior year as a salesman for the industrial products division of Texize. He continued in that position, serving northwest South Carolina and northern Georgia until his transfer to the textile division.

W. Roy Elliot has been elected president and general manager of Shawinigan Resins Corp., Springfield, Mass. Elliot, who has been vice-president and general manager, succeeds Robert K. Mueller, who was elected board chairman. Others elected include William H. Bromley, secretary and vice-president—marketing; Alfred W. Long, treasurer and vice-president—finance and planning; Dr. Robert N. Crozier, vice-president—research; and John C. Kenny, vice-president—production and engineering.


Stevenson

Ciba Co. Inc., Fair Lawn, N. J., has announced a reorganization of its sales and administrative responsibilities. Dr. C. J. Weidmann, vice-president and technical director, assumes increased responsibilities in the direction and coordination of the three product divisions. C. O. Stevenson, formerly sales manager of the company's Southern district, has been named manager of the dyes


Russell


Nevins

division. F. P. Russell, formerly manager of Ciba's Philadelphia, Pa., district, has been named commercial manager, and F. E. Nevins, formerly sales supervisor of the Philadelphia district, has been named manager of the district.

James M. Richbourg has joined the sales engineering staff of Marshall & Williams Southern Corp., Greenville, S. C. A graduate of Clemson A & M College, he spent three years with General Electric Co. at Schenectady, N. Y. and Atlanta, Ga. For the past 12 years he has been associated with John D. Hollingsworth Co. as chief engineer.

Onyx Chemical Corp., Jersey City, N. J., has announced two personnel changes in its organization. Dr. Arnold Lada, formerly director of technical services, has been appointed district manager of the New York Metropolitan area. He will be responsible for all field sales activities for the company in New York City, Long Island, Northern New Jersey and Southern New York state. John C. Findlan is the new sales development director. His duties include directing application and market development of the company's Maprofix series of alcohol sulfate detergent raw materials and BTC and Ammonyx series of cationic germicides and industrial processing intermediates in new industries. He was previously sales manager of Geigy's industrial chemical division.

James Abrams, manager of the Whitmire, S. C., plant of J. P. Stevens & Co., will take on additional duties as manager of the Ragan Plant near Gastonia, N. C. Abrams, a graduate of Clemson College, has been manager of the Whitmire plant since 1954.

# OBITUARIES

**Osborne Bezanson,** former president and chairman of the board of The Chemstrand Corp., New York City, died February 27 in Boston, Mass., after an extended illness. He was president of the firm from 1951 until 1953, when he was elected chairman of the board. He held this position until 1955. Prior to joining Chemstrand, Mr. Bezanson served for 45 years with the Monsanto Chemical Co. Survivors include his widow, three sons and two daughters.

**George O. Hamlin,** 84, former sales manager of American Viscose Corp., and one of the leaders in the rayon industry in the period ended 1932, died of pneumonia recently in a New York City hospital. Mr. Hamlin joined American Viscose in 1910 at the time of its formation by Courtaulds Ltd. He was named sales manager about 1922 and continued in that capacity until his retirement from the company in 1932. A brother survives.

**Lawrence S. Holt,** 77, former textile executive, died March 13 at his home in Asheville, N. C., after a long illness. A 1904 graduate of the University of North Carolina, Mr. Holt joined his father and two brothers in cotton manufacturing in the partnership of Lawrence S. Holt & Sons. The firm was owner of Aurora Cotton Mills of Burlington and Gem Cotton Mills of Gibsonville, N. C. He also served as president of Sevier Cotton Mills of Kings Mountain; secretary and treasurer of Union Cotton Bagging Corp., Norfolk, Va.; president of Altamahaw (N. C.) Cotton Mills; and director of L. Banks Holt Mfg. Co. of Graham, N. C., and Erwin Yarn Agency of Philadelphia, Pa. Survivors include two sisters and a brother.

**Fred Stilson Perkerson,** 50, manager of the central laboratory and testing, Cone Mills Corp., Greensboro, N. C., died March 10 in a Greensboro hospital after a heart attack. Dr. Perkerson joined Cone in 1959. Prior to that he was chief of the cotton chemical laboratory of the Southern Utilization Research & Development Division of the Department of Agriculture in New Orleans, La. For 13 years he served as chief chemist with Callaway Mills Co. Survivors include his widow and two daughters.

**Edwin P. Waite,** 56, vice-president, secretary and chief engineer of Cole Engineering Co., Columbus, Ga., manufacturer of textile machinery parts, died recently after a heart attack. Mr. Waite had been with Cole Engineering since 1953. Survivors include his widow and a son.

# MILL NEWS

CONSTRUCTION. NEW EQUIPMENT. FINANCIAL REPORTS. CHARTERS. AWARDS. VILLAGE ACTIVITY. SALES AND PURCHASES

DURHAM, N. C.—Millburn Mills is expected to begin limited operations here in the very near future. The firm, a part of Millburn Mills of West Warwick, R. I., will dye and finish cotton piece goods used in millinery, coat and suit linings. Renovations to the existing building cost around $60,000. The company is presently involved in the installation of new equipment. The plant is expected to employ about 100 local workers.

NEW YORK, N. Y.—Klopman Mills has entered into an agreement with Burlington Industries to lease the Old Dominion Finishing Co. at Hurt, Va. Klopman's Dacron and cotton blends are finished at the Hurt plant. Burlington pointed out that the lease will not affect operations of Burlington Finishing Co., at Dublin, Va. Klopman said the purpose of the lease was to insure rigid control of quality from yarn to finished fabric.

AUGUSTA, GA. — John P. King Mfg. Co. here reports increased earnings on declining sales for fiscal 1960. For the year ended December 10, 1960, the company had a net profit of $536,959 as compared with $445,-693 in 1959. Sales for the year totalled $12.7 million against $14.4 million in 1959. The company employs 1,200 persons in the manufacture of wide sheetings, drill, twills and industrial fabrics.

JOANNA, S. C.—Joanna Cotton Mills Co. here recently paid $130,000 in wage dividends to employees. Payments represented 2.5% of yearly earnings for each employee working more than 1,800 hours in 1960. Employees with 1,000 to 1,800 hours were paid bonuses on a sliding scale based on the number of hours worked. This was the 22nd dividend paid by the company in the 24 years the bonus plan has been in operation.

SPARTANBURG, S. C. — The 15th annual safety meeting of Reeves Bros. was held at the company's Fairforest Finishing Division here March 1. The president's recognition cup for having operated the greatest number of days since the last disabling injury went to Chesnee (S. C.) Mills. The employees of Mills Mill at Woodruff, S. C., received the first place plaque for having operated the greatest number of hours during 1960 without a disabling injury.

GREENVILLE, S. C. — Woodside Mills of Dan River Mills reports net sales of $50.2 million during 1960, a 6% increase over 1959's total of $47.4 million. Net earnings for the year were $2.6 million as compared with $1.9 million previously. During the year Woodside spent $3.1 million on fixed asset acquisitions. Some $310,000 of this was spent on land and buildings, while $2.8 million was spent on machinery and other equipment.

CLOVER, S. C.—The American Thread Co. has announced plans to modernize its Hampshire spinning plant here at a cost of about $500,000. The modernization of existing machinery will be aimed at achieving improved quality and efficiency. R. M. Pulley, general manager of the company's three plants in Clover, said that contracts for new spinning machinery and cleaning equipment have been let to Whitin Machine Works, Whitinsville, Mass., and Pneumafil Corp., Charlotte, N. C., respectively.

WEST POINT, GA. — A 12% decrease in sales and a 32% decline in profits for the first six months of the fiscal year, have been reported by West Point Mfg. Co. "Net sales were $34.5 million for the three months ending February 25, 1961," President Joseph L. Lanier reported, "which brings the six-month total to $69.9 million and compares with $79.8 million for a corresponding period of 1960." Net income for the six months was $2.8 million compared to $4.1 million for the same period last year. "Sales volume and profits have declined from the relatively high levels of the previous fiscal year," Lanier said. "However, unfilled orders on hand are down only 2% from the beginning of the fiscal year. Further, our unfilled order position has shown moderate increases in each of the last two months."

ARAGON, GA. — Aragons Mills' employees have voted an end to Local 789 of the Textile Workers Union of America. The company had petitioned the National Labor Relations Board for the election at the end of the last contract, contending that "there were serious doubts that the T.W.U.A. represented a majority of the employees." The employees voted 262 against the union. There were 24 challenged votes, three void and 193 for the union. The plant was organized as it was operated by the former owner, the A. D. Juilliard Co. The successor company, United Merchants & Manufacturers Inc., acquired the plant in 1953.

NEW YORK, N. Y.—Indian Head Mills Inc. together with its consolidated subsidiaries reports sales of $81.9 million in the fiscal year ended December 3, 1960. This compares with $56.2 million in the previous fiscal year. The 46% increase in the sales figure was attributed to the acquisiton of four additional businesses during the year, Hoosac Mills, USF-Arnold Finishing Co., Bernhard Ulmann Co. and Bachmann Uxbridge Worsted Co. Consolidated net profits amounted to $3.6 million after provision of $325,000 for federal income taxes. This compares with profit of $3.5 million in 1959.

GLASGOW, VA.—The employees of James Lees Co. voted 1,193 to 765 against representation by the Textile Workers Union of America in a National Labor Relations Board election conducted here recently. There were 110 votes challenged by the union, 10 challenged by other parties and five void ballots. This election was held as a result of the N.L.R.B. setting aside the election which was held at this plant on March 16, 1960, at which time the employees of the plant also rejected the T.W.U.A. The Lees plant here is the largest carpet plant in the South. The company is affiliated with Burlington Industries.

BOSTON, MASS. — The Kendall Co. will undertake the largest capital expenditure program in its history during 1961, according to President Richard R. Higgins. The capital program of between $8 and $9 million dollars includes expansion of productive capacity, especially for nonwoven fabrics, and the construction of new plant facilities necessitated by the path of an expressway in Chicago which will eliminate Kendall's Bauer & Black plant. The company's 1960 sales of $111.6 million represented an increase over the 1959 sales of $110.7 million and 1960 earnings of $5.1 million compared closely with the 1959 earnings' total of $5.2 million. Kendall reports that its sales of finished fabrics to the apparel trade were broadened by the acquisition of the business of the American Bleached Goods Co., a former customer.

COLUMBUS, GA. — The Eagle & Phenix Division of Reeves Bros. here plus other textile mills in the area suffered an undetermined amount of damage when the Chattahoochee River jumped her banks and flooded buildings in the worst flood since 1929. West Point Mfg. Co.'s Lanett, Langdale and Riverdale Mill at River View, Ala., received minor damage from the flood. Water rose three feet in the Riverdale Mill's machine shop which is on a lower level than the rest of the mill. Some water damage was done to the roller shop of the Lanett plant.

GREENSBOBO, N. C.—J. P. Stevens & Co. reports a sharp decline in sales and earnings during the first three months of the fiscal year. Sales for the period totalled $98.3 million as compared with $114.8 million for the

same period in the previous year. Net income was $1.7 million as compared with $4.3 million in the same period of 1960. Robert T. Stevens, president, said that there is some evidence that the textile downswing may reverse itself about midyear. He said that there were some encouraging signs that the government would take some steps to provide the textile industry with some sort of protection against the influx of textiles from low-wage countries abroad.

JOANNA, S. C.—Joanna Cotton Mills Co. has placed an order with the Roberts Co., Sanford, N. C., for 50,000 new Roberts Supreme ball bearing spindles. Joanna had previously contracted with Roberts for the modernization of 215 spinning frames totalling 50,000 spindles with Roberts FC drafting system.

NEW YORK, N. Y.—Consolidated net sales of Bigelow-Sanford Inc. for the year ended December 31, 1960, were $74.2 million, an increase of 3% over sales of $71.9 million for the preceding year. Figures for 1960 include Crestliner operations from April 1, the date on which this subsidiary was acquired. Net profit for 1960 was $1.4 million. For the year 1959, net profit was $1.9 million. Net sales for the fourth quarter of 1960 were $20.6 million, a decrease of 3% below sales of $21.3 million for the same period of 1959. Net profit for the fourth quarter of 1960 was $181,000 as compared with $639,000 in the fourth quarter of 1960. L. P. Weicker, president, said that exclusive of the Hartford Fibres Division, operations of the balance of the company showed some improvement in 1960 over the prior year in both sales volume and net profit earned.

SAXONVILLE, MASS.—Roxbury Carpet Co. reports consolidated net sales of $15.3 million for 1960. Net earnings after taxes totalled $97,194 for 1960 compared with $1.2 million in 1959. The company said that the carpet industry had a drop in sales of approximately 14% in woven products in 1960 from 1959, resulting from the decline in residential building and the significant increase in imports, particularly in Wilton fabrics. The continued growth and development of tufting was a balancing factor. Although Roxbury is viewing 1961 with some caution for at least the first half of the year, the company has a strong feeling that the net result for the full year will show a definite upturn in volume and profit.

BRUNSWICK, N. C. — National Spinning Co. has announced plans to double the size of its plant here. The plant contains 68,000 square feet of space at present and employs about 100 persons in the production of woolen and synthetic yarns for the knitting trade.

GREENSBORO, N. C.—Cone Mills Corp. has purchased 377 Saco-Lowell 20x42-inch Anti-Friction card coilers for its White Oak Mill at Greensboro. The company has also ordered 32 Saco-Lowell SJ MagneDraft spinning frames for its Pineville, N. C., plant. These will be of four-inch gauge, 264 spindles each, with $2\frac{1}{4}$-inch Marathon rings for spinning 16s to 26s carded yarn. The installation of Saco-Lowell MagneDraft frames is a continuation of Cone Mills modernization program.

WEST POINT, GA.—West Point Mfg. Co. is seeking to sell its electric distribution system which serves the communities of Shawmut, Langdale, Fairfax and River View. The company together with Alabama Power Co. of Birmingham has filed an application with the Federal Power Commission asking that West Point be allowed to sell its power interest to the power company. The proposed purchase price is $1.75 million. West Point has some 3,700 power customers in the four communities.

GREENVILLE, S. C.—Maverick Mills, Boston, Mass., is planning to construct a new $4 million plant here under its White Horse Division. The plant will employ some 150 to 200 persons with 600 looms in operation. It will produce wide cotton fabrics on 50-inch looms. The new facility will be located adjacent to the present White Horse Mill here, which employs some 525 persons.

LANCASTER, S. C.—Springs Cotton Mills has contributed more than $2.3 million to the Springs fund, the employee-owned profit-sharing trust, for the year 1960, according to H. W. Close, president. Close also pointed out that two profit-sharing payments had been made to all employees in cash during the year. In June the company paid a total of $785,947 to its employees as part of the profit-sharing. In December $762,403 was distributed. The company's 1960 payment to the Springs fund was the largest annual contribution ever made by it to the fund. Some 8,836 employees participate in the profit-sharing trust.

# *Textile Industry Schedule*

**For additional data (reservation requirements, membership requirements, program details, etc.) on activities listed here, contact name(s) shown in parentheses.**

**Apr. 6 (Th)—Spring meeting, Piedmont Division, Southern Textile Association, Johnston Memorial Y.M.C.A., 3025 N. Davidson St., Charlotte, N. C.** (Chairman: J. W. Inscoe, Carolina Mills Inc., Maiden, N. C.)

**Apr. 10-13 (M-Th)—30th National Packaging Exposition, Lakefront Exposition Hall, Chicago, Ill.** (American Management Assn., 1515 Broadway, New York 36, N. Y.)

**Apr. 12-14 (W-F)—Annual meeting, Alabama Textile Manufacturers Association, Buena Vista Hotel, Biloxi, Miss.** (Dwight M. Wilhelm, Exec. V-P, A.T.M.A., 125 S. McDonough St., Montgomery 4, Ala.)

**Apr. 14 (F)—Spring meeting, South Carolina Division, Southern Textile Association, Clinton High School, Clinton, S. C.** (Chairman: D. H. Roberts, Lydia Cotton Mills, Clinton, S. C.)

**Apr. 16-18 (Su-Tu)—Spring meeting, Narrow Fabrics Institute, The Tides Inn, Irvington, Va.** (Narrow Fabrics Institute, 11 W. 42nd St., New York 36, N. Y.)

**Apr. 18-19 (Tu-W)—Spring meeting, Technical Advisory Committee and Board of Trustees, Institute of Textile Technology, Charlottesville, Va.**

**Apr. 21 (F)—Spring meeting, Eastern Carolina Division, Southern Textile Association, Turnage's Restaurant, Durham, N. C.** (Chairman: T. B. Stevens, Erwin Mills, Erwin, N. C.)

**Apr. 22 (Sa)—Spring meeting, Georgia Textile Operating Executives, Hightower Building, Georgia Tech, Atlanta.** (James L. Taylor, Director, A. French Textile School, Georgia Tech, Atlanta)

**Apr. 26-29 (W-Sa)—Annual meeting, Georgia Textile Manufacturers Association, Hollywood Beach, Hollywood, Fla.** (T. M. Forbes, Exec. V-P, G.T.M.A., Suite 740, 34 Peachtree St., N. W., Atlanta 3, Ga.)

**Apr. 27-28 (Th-F)—Spring meeting, The Fiber Society, Georgia Center for Continuing Education, Athens, Ga.** (Sec: Julian Jacobs, P. O. Box 405, Athens, Ga.)

**Apr. 29 (Sa)—Spring meeting, Northern North Carolina-Virginia Division, Southern Textile Association, Hylton Hall (Dan River Mills), Danville, Va.** (Chairman: Herman Cone Jr., Cone Mills Corp., Greensboro, N. C.)

**April 29 (Sa)—Spring meeting, Alabama Textile Operating Executives, Thach Auditorium, Auburn University, Auburn, Ala.** (Cleveland L. Adams, Auburn University, Auburn, Ala.)

**May 4-5 (Th-F)—Thirteenth annual conference, Textile Industry Committee, American Institute of Electrical Engineers, Heart of Atlanta Motel, Atlanta, Ga.** (Robert I. Uhl, Manager, Service Division, West Point Mfg. Co., Langdale, Ala.)

**May 5-6 (F-Sa)—58th annual meeting, Phi Psi Fraternity, Shoreham Hotel, Washington, D. C.** (A. Henry Thurston, 4515 Dexter St., N. W., Washington, D. C.)

**May 10-12 (W-F)—Thirty-first annual North Carolina Statewide Industrial Conference, Jack Tar Hotel, Durham, N. C.** (H. S. Baucom, Director, N. C. Industrial Commission, Raleigh, N. C.)

**May 15-20 (M-Sa)—National Cotton Week, sponsored by the National Cotton Council.**

**May 16-17 (Tu-W)—Joint meeting, Cotton Research Clinic and the Cotton Marketing Conference, Peabody Hotel, Memphis, Tenn.** (National Cotton Council, P. O. Box 9905, Memphis 12, Tenn.)

**June 22-24 (Th-Sa) — 53rd annual meeting, Southern Textile Association, Ocean Forest Hotel, Myrtle Beach, S. C.** (S.T.A., P. O. Box 1225, Charlotte 1, N. C.)

**(M) Monday; (Tu) Tuesday; (W) Wednesday; (Th) Thursday; (F) Friday; (Sa) Saturday; (Su) Sunday**

Vol. 87 APRIL 1961 No. 4

textile bulletin

*Editor* . . . . . . . . . . . . . . . JACK KISSIAH
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*Inquiry & Reader Service* . . . . . . . JACQUELINE BOYLES

**TEXTILE BULLETIN is devoted to the dissemination of information and the exchange of opinion relative to the spinning and weaving phases of the textile industry, as well as the dyeing and finishing of yarns and woven fabrics. Appropriate material, technical and otherwise, is solicited and paid for at regular rates. Opinions expressed by contributors are theirs and not necessarily those of the editors and publishers. ¶ Circulation rates are: one year payable in advance, $1.50; two years payable in advance, $2.00; one year, Canada, $3.00; one year, other countries in Postal Union, $5.00; single copies, 25 cents. ¶ A companion monthly journal, THE KNITTER, is published by Clark Publishing Co. and devoted to the interests of the knitgoods manufacturing industry.**

TEXTILE BULLETIN IS PUBLISHED MONTHLY BY

CLARK PUBLISHING COMPANY

— Offices and Plant: 218 West Morehead Street, Charlotte 6 —
P. O. Box 1225 • CHARLOTTE 1, N. C. • Tel. EDison 3-3173

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## The Spread Of Obsolescence

IF you've ever wondered why mill men call a machine "new" for years and years and years after they buy it, a look at some recent figures compiled by the American Textile Machinery Association will explain it.

**Textile Machinery In Place — 1960 And Approximate Period Of Installation**

| Machines | 1960 -1950 | 1950 -1940 | 1940 -1920 | Older than 1920 | Total in Place |
|---|---|---|---|---|---|
| Pickers | 14.01% | 17.34% | 32.84% | 35.81% | 100% |
| Cards | 10. | 9. | 8. | 73. | 100 |
| Drawing | 15.39 | 30.25 | 43.36 | 11. | 100 |
| Combers | 23.84 | 55.15 | 11.45 | 9.56 | 100 |
| Roving | 27.03 | 35.35 | 27.86 | 9.76 | 100 |
| Spinning | 19.3 | 21.66 | 37.46 | 21.58 | 100 |
| Looms | 25. | 30. | 18. | 27. | 100 |

The figures, presented recently by the A.T.M.A. in a statement filed with the subcommittee of the Committee on Interstate and Foreign Commerce, reflect the continuing decline in purchases of new capital equipment by the domestic textile industry. In the last three years, textile machinery manufacturers have averaged operating at only 60% of their 1950 capacity. Employment in their shops has dropped 40% in the same period. Shipments for 1960 were approximately one-half the 1951 unit production despite the fact that dollar volume at $380 million was the highest since 1951.

The trouble, the A.T.M.A. told the subcommittee, stems from two sources: (1) the flood of low wage imports cut heavily into the already thin margins on which most domestic mills operate, leaving diminishing funds for purchase of new equipment; (2) the outdated, unrealistic depreciation treatment extended textile machinery.

With less money to spend, American mills have shown an increasing interest in foreign built equipment. Imports of such equipment in 1959 were 89% above 1958 and estimates for 1960 are 300% above 1958. In unit production an estimated 30% of machinery installed in domestic mills during 1960 was foreign built. To that must be added the funds that will have to be spent with foreign machinery manufacturers for repair parts and maintenance equipment.

In no instance, the A.T.M.A. told the subcommittee, has the association found that foreign built equipment of a type comparable to that built in the U. S. is purchased because it is more efficient than U. S. built machinery. It was bought simply because it is cheaper.

If domestic mills could through revisions of the depreciation schedules be permitted to buy what American textile machinery manufacturers have available for them, here's what they could do with what is now on the market:

(1) Pickers—Improvements since 1953 in this process can increase man-hour productivity by 16%.

(2) Cards—Improvements and refinements in carding equipment have reduced man-power costs by at least 10%. And a new type card now in the development stage is expected to increase productivity five to one.

(3) Drawing Frames—Production efficiencies have increased 300% in the last three years, with a 75% reduction in man-hours per shift.

(4) Combers—Modern combers have a productive efficiency 138% greater than previous models, with 90% reductions in payroll costs.

(5) Roving Frames—Man-hour costs have been reduced by 75% each 40-hour shift; payroll costs have been decreased 66%.

(6) Spinning Frames—Efficiencies of 95-96% attainable with new developments in spinning, with a resultant 60% reduction in payroll costs.

(7) Looms—Increases as high as 300% in weaver productivity; 130% in fixer productivity; 66% drop in payroll costs.

The A.T.M.A. says it; and the figures bear it out. Machinery manufacturers aren't approaching the peril point. They've passed it.

# Index to Advertisers



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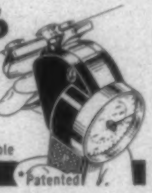


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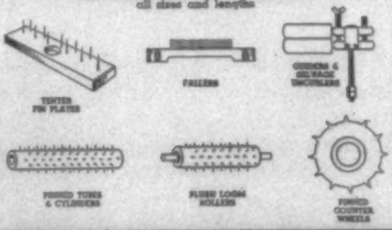

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VOL. 87 APRIL 1961 NO. 4

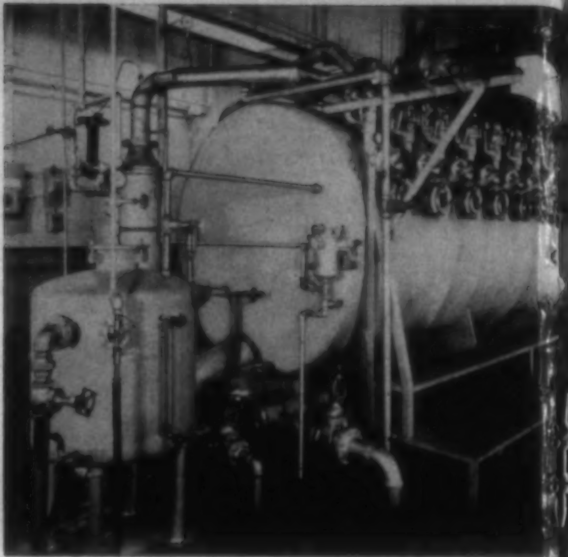
# This issue of TEXTILE BULLETIN . . .

## . . . features

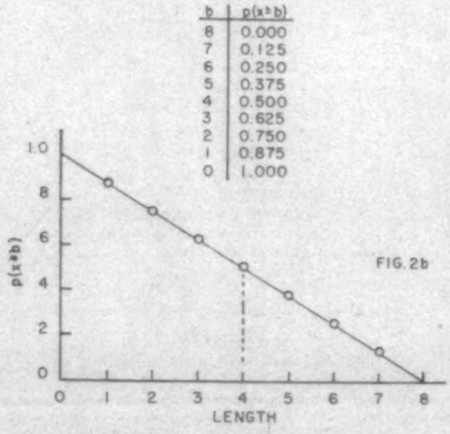


## . . . and includes





**Jet Dyeing Machine, Page 14**




**Using The Fibrogram, Page 54**

**Automatic Doffers, Page 60**

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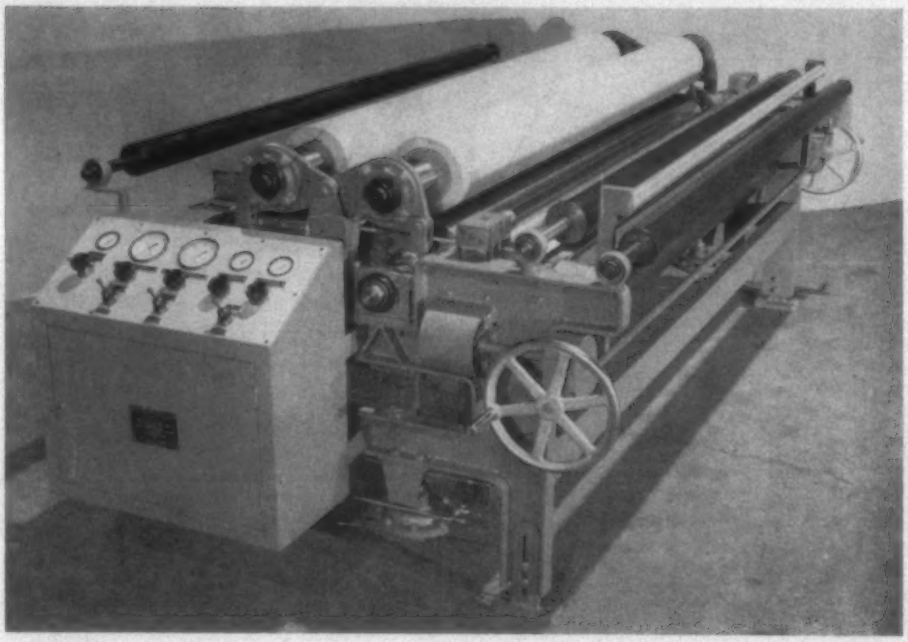

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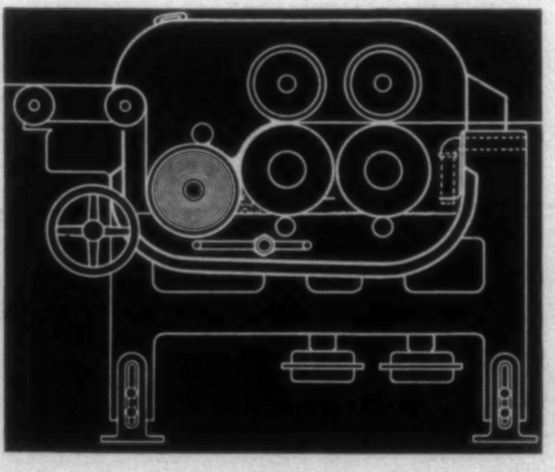

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